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WALLACEBURG
TRAFFIC PLANNING STUDY

M. M. DILLON LIMITED
CONSULTING ENGINEERS

OCTOBER 1965

M. M. DILLON LIMITED CONSULTING ENGINEERS

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OUR FILE: 5948-0
YOUR FILE:

October 1965.

His Worship the Mayor and Council,
The Corporation of the Town of Wallaceburg,
786 Dufferin Avenue,
WALLACEBURG, Ontario.

Gentlemen:

We are pleased to submit our report covering the Wallaceburg Traffic Planning Study, and trust that the document fulfills all requirements outlined in our engineering agreement of August 1964.

Our own field investigations, augmented by readily available background material, enabled us to analyze existing and future roadway and downtown parking needs for the period 1964 to 1985. We feel that a realistic basis has been established for projecting current trends to the limit of the study period, and in particular, that vital questions concerning Sydenham River crossings have been examined in depth.

The potential for industrial expansion and attendant population growth within the Wallaceburg area is substantial; however, the ability to achieve this potential will, to a major extent, depend upon the establishment of a safe, flexible and efficient circulation system. Hence, we have recommended a staged improvement program that will not only overcome current deficiencies, but also satisfy ever-increasing transportation demands fostered by continuing development.

The policy of meeting frequently with the Technical Coordinating Committee has proven most valuable: such consultations have contributed much to the overall coherence and suitability of the proposals. We

have derived considerable satisfaction from working on this important assignment, and stand ready to advise the Corporation as the various projects outlined herein are considered for implementation.

Respectfully submitted,

M. M. DILLON LIMITED.

John R. Crosby

John R. Crosby, P. Eng.,
Project Director

Edward J. Levy.

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Edward J. Levy, P. Eng.,
Project Manager.

WALLACEBURG TRAFFIC PLANNING STUDY

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F O R E W O R D

We sincerely hope that the Wallaceburg Traffic Planning Study will serve the Town Council - and indeed all citizens of Wallaceburg - by indicating how their efforts may be most effectively channelized in this vital aspect of future growth - the maintenance of an efficient traffic circulation system.

Throughout the report, goals and objectives of this comprehensive transportation study have been defined and reiterated: while the study is specifically concerned with the function and improvement of the major roadway system, and with closely related factors such as vehicle operation, traffic management and parking, we have attempted to give full weight to other vital considerations such as planning and control of land use, which largely dictate the form and fabric of the urban area.

INTRODUCTION - Section 1

In this short preamble, we briefly describe Wallaceburg's history and setting, and present an outline of the study terms of reference.

ASSEMBLING THE DATA - Section 2

This section is introduced by referring to the survey methods employed. The concept of subdividing the area for traffic flow analysis is discussed, and all field surveys undertaken during the course of the Traffic Planning Study are fully described: these include origin and destination surveys, various traffic counts, speed and delay surveys and parking surveys.

The following subsection deals with prevailing traffic characteristics in the Wallaceburg area. The street and highway network itself is discussed, and reasons for its historical development and present form are suggested. Traffic flow patterns on various route classifications are examined, and results of the various volume, capacity, travel time, and speed and delay surveys are presented and analyzed. Some aspects of traffic safety are discussed, and "high-accident frequency" locations on Wallaceburg's major route system are dealt with in some detail. Finally, analysis is made of vehicular and pedestrian traffic entering, leaving, passing through and moving within the downtown area.

The last subsection deals with parking practices in the central traffic district, and is based upon the Simplified Parking Study conducted within that area. A survey is made of available accommodation, and characteristics such as parking usage, turnover and accumulation are examined. Illegal and/or overtime parking at meters is also discussed.

In addition to providing a detailed description of investigations forming the background of this study, Section 2 offers suggestions for modifying and improving the transportation elements referred to, as well as comments on prospective future policies.

DEFINING THE PROBLEM - Section 3

During the late summer of 1964, when field work for this study was being carried out, many people - both drivers and pedestrians - were stopped and interviewed on the Lord Selkirk, Dundas and Centre Bridges, and were asked to give information concerning their current trips. A high percentage of those stopped cooperated generously with our interviewers.

This section presents results of the origin and destination survey, and contains a detailed analysis of TRANS-RIVER TRAVEL DESIRES. The waterways which subdivide Wallaceburg are unquestionably very scenic and pleasant, but are largely responsible for disrupting and distorting the circulation pattern within the urban area. Hence, the matter of providing and locating additional Sydenham River bridges is crucial: indeed, the recent closure to traffic of the venerable Centre Bridge was the inciting force, as it were, which led ultimately to this comprehensive Traffic Planning Study.

By relating reported trips to trip purpose and land uses, a basis for projecting future travel patterns has been established. Estimates were then made of how the future growth and form of the urban area is likely to affect current travel habits and demands, and projections of traffic volumes were made to represent 1985 conditions.

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All work to this point involved investigations of prevailing conditions and the projection of travel patterns into the future. When projected travel demands are examined in the light of desirable standards of roadway design, capacity and overall circulation, future requirements may be clearly defined.

THE PLAN - Section 4

In formulating our recommendations, we have taken account of present deficiencies revealed by the field surveys, of the projected development of Wallaceburg, of plans and proposals previously suggested by others, and finally, of the profound influence exerted by the Sydenham River system upon the entire urban fabric.

A detailed discussion of alternative bridge sites is included here, and factors which led to recommendations concerning this vital matter, are fully explored.

After evaluating all pertinent factors, a 20-year PLAN OF RECOMMENDED IMPROVEMENTS is presented: the program outlines logical and orderly development of new and improved facilities, in a sequence of four five-year construction stages. Discussions of project scheduling, cost estimates and cost distributions are followed by illustrated descriptions of several proposed roadway and river-crossing improvements.

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Only when all the above has been reviewed can the most important work - that of translating the plan into action - be started. The citizens of Wallaceburg, the Town Council and the Ontario Government must study the report, discuss the proposals, make any necessary adjustments, and then formally adopt the recommendations and provide adequate money and staff to implement them. The full value of the long sequence of planning, design and construction will be realized only when residents and visitors alike can travel safely, conveniently and efficiently throughout the area. Suggestions aimed at achieving these objectives are presented at the end of Section 4.

APPENDICES

The detailed, annotated technical appendix to the report contains much of the factual data and survey material produced during the progress of our work. These are intended to record details and results of the various surveys, to explain the study findings in some depth, and to provide a background against which to examine the proposals and the overall plan. It is believed that this body of reference material will enhance the usefulness of this document, and that these data will become the foundation for any subsequent extensions to the work covered herein.

A detailed glossary is also included in the Appendix: this deals with technical terms used in the present report, and to some extent, with traffic engineering terminology in general.

Finally, a complete bibliography is provided, which lists all reports, tabulations, manuals and texts referred to during the preparation of the Wallaceburg Traffic Planning Study report.

ACKNOWLEDGEMENTS

During the course of the analysis, several municipal and provincial government agencies, as well as certain private organizations, were consulted. We were most fortunate to receive generous cooperation from all individuals concerned.

The assistance thus tendered greatly enhanced the value of all data and recommendations set forth in this Traffic Planning Study report. To the following, therefore, we extend our sincere gratitude:

- The Corporation of the Town of Wallaceburg

  His Worship, Mayor A. B. Cousins,
  Chief Constable D. R. Cushman of the Wallaceburg Police Department, and
  Mr. R. E. Crombie, P. Eng., Town Engineer,
  to whom a special vote of thanks is due for the veritable mountain of data he has secured and documented at our request.

- The Department of Highways, Ontario - Traffic Section

  Mr. A. E. Argue, P. Eng., Urban Planning Studies Engineer,
  Mr. W. B. Chown, P. Eng., Assistant Planning Studies Engineer,
  Mr. Paul de Valence, P. Eng., Liaison Engineer
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- South-Western Region

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  Mr. J. Vandekka, P. Eng., Project Planning Engineer

- Mr. A. Crossley, M.R.A.I.C., M.T.P.I.C.

  Architect and Planning Consultant

- The County of Kent

  Mr. W. D. Colby, P. Eng., County Engineer and Roads Superintendent

- The Ontario Department of Transport

- The Government of Canada

Department of Public Works

Harbours and Rivers Engineering Branch
Mr. G. N. Scroggie, P. Eng., District Engineer

Department of Mines and Technical Surveys
Surveys and Mapping Branch

Dominion Bureau of Statistics

Unemployment Insurance Commission

- The Chesapeake and Ohio Railway Company

Mr. F. W. Carruthers, Regional Superintendent

- The Southwestern Sales Corporation Ltd.

Mr. G. Frye

In addition, we extend our thanks to The Chatham Daily News and to The Wallaceburg News for arranging interviews and photographic coverage of traffic survey activities. Valuable service was thus performed, in gaining for us the confidence and goodwill of the public.

We hasten to recognize the overall project coordination afforded by members of the Wallaceburg Traffic Planning Study Technical Coordinating Committee. Without this body's efforts and advice, the work could not have been undertaken successfully:

Chairman - Mr. R. E. Crombie, P. Eng.,
Town Engineer, Town of Wallaceburg,
Mr. L. D. Brander, Chairman,
Wallaceburg Planning Board,
Chief Constable D. R. Cushman,
Wallaceburg Police Department,
Councillor D. Wells,
Town of Wallaceburg,
Mr. W. B. Chown, P. Eng.,
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Department of Highways, Ontario,
Mr. J. W. Wice, P. Eng.,
District Municipal Engineer,
Department of Highways, Ontario.

M. M. Dillon Limited - Transportation Planning Department

Finally, we acknowledge the contribution of those staff members responsible for the analysis and documentation of the Wallaceburg Traffic Planning Study:

Analysis and Report:

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Miss J. Smith and Mrs. H. Teti

SECTION 1 - INTRODUCTION

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EXHIBITS

BR. BRIDGE
TU. TUNNEL
▲. FERRY

THE POSITION
OF
WALLACEBURG

1.1 HISTORIC AND GEOGRAPHIC BACKGROUND

Wallaceburg is widely known as "The Glasstown", because of the long and colourful history of this important local industry. However, the manufacture of glass products is but one factor contributing to the Town's prosperity: indeed, the degree of industrial diversification observed in Wallaceburg is characteristic of much larger communities.

As indicated on the left, the area is well served by road, rail and water transportation facilities. It is located on King's Highway No. 40 between Chatham and Sarnia, and convenient connections to the MacDonald-Cartier Freeway (Highway No. 401) are afforded by way of either Highway 40 or Highways 78 and 21. Connections to the United States highway network are close at hand, involving ferry services and the Blue Water International Bridge at Sarnia.

The Town is also served by a branch of the Chesapeake and Ohio Railway: although no passenger service is provided, the line is important to the area's industrial concerns. In addition, the Sydenham River is navigable through Wallaceburg, and represents a direct connection with the St. Lawrence Seaway system.

The wide assortment of industries, the range of available transportation facilities and the proximity in time and space to the Windsor-Detroit metropolitan area all lead to the conclusion that Wallaceburg's potential for industrial/commercial expansion - and attendant population growth - is most impressive.

In addition, the area is justifiably popular with tourists: during the summer, a host of yachts and cabin cruisers ply local waterways, while thousands of motorists explore the "Blue Water Route" and the prosperous, fascinating Indian community on Walpole Island.

In order to accommodate increased traffic volumes arising from the Town's growth, several improvements involving local streets and highways in general and river-crossing facilities in particular, will be required during the next twenty years. In a progressive community, the benefits of a comprehensive program, in terms of economics, convenience and overall attractiveness, will certainly justify the costs involved. Increased population and business tempo invariably

lead to increased transportation needs, and every citizen of Wallaceburg - including those yet to be born - will profit from the implementation of a rationally conceived, properly coordinated sequence of roadway improvements.

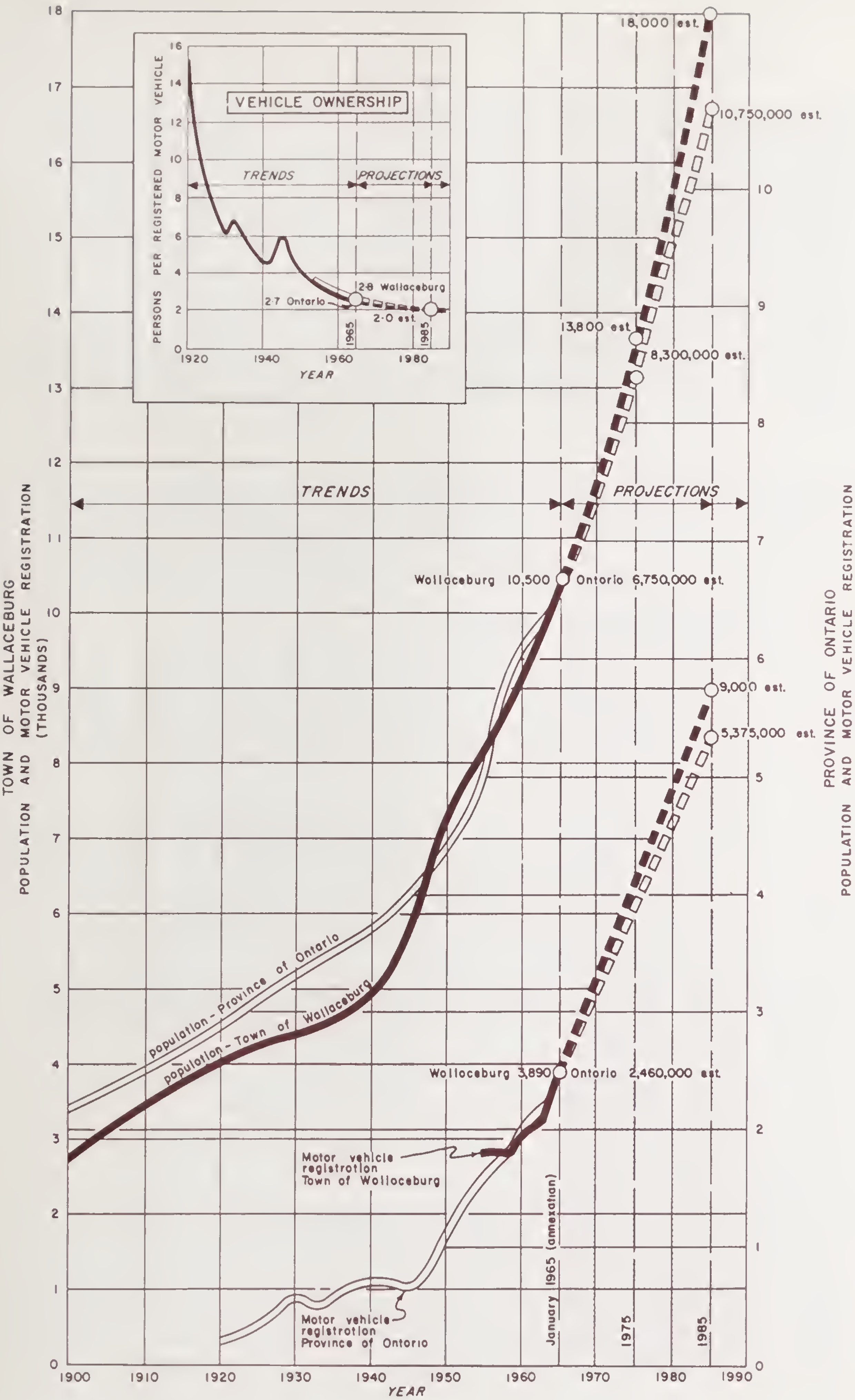
1.2 GROWTH TRENDS AND PROSPECTS

On January 1, 1965, 1,298 acres of Chatham Township were officially annexed to Wallaceburg. Population and land use projections prepared by the Town's planning consultant were reviewed by the Ontario Department of Highways: these projections indicate that the population within the new Town Limits will reach at least 15,000 by 1985, and could reach 18,000, depending upon the rate of industrial and commercial development.

All analyses and recommendations within the context of this report are based upon 1964 and projected 1985 populations of 10,500 and 18,000, respectively. It is felt that the use of the latter figure - a relatively high projection - will provide a margin of safety in the design of improvement proposals: such a "cushion" is not at all undesirable when long-range plans are being formulated.

Exhibit 1.A indicates historical population trends and projections to the year 1985, for both the Town of Wallaceburg and the Province of Ontario. It is evident that the growth patterns are quite similar, and the chart has been devised so that 1964 population levels for the Town and the Province coincide. Since 1900, the provincial population has increased over 200%, while that of Wallaceburg has increased over 280%: moreover, by 1985, it is estimated that the Province will have a population 60% greater than at present, whereas Wallaceburg's population will likely experience a 70% growth.

Since the end of World War II, Wallaceburg has - like other towns and cities - experienced accelerated growth and development. Considering not only all factors discussed earlier, but also the prospect that a major new source of electrical power is now being developed just north of the Town, it is clear that Wallaceburg is virtually assured of continuing industrial prosperity and growth.



POPULATION AND VEHICLE OWNERSHIP

TRENDS AND PROJECTIONS

The 1964 motor vehicle ownership ratio within the study area was 2.8 persons per motor vehicle - for all practical purposes the same as that recorded for the Province of Ontario as a whole. Furthermore, since the two ratios have remained roughly equivalent for several years, and since Wallaceburg is bound to share the prosperity of the Province, it may be assumed that the vehicle ownership ratios will experience identical growth over the next twenty years. Economic and demographic studies indicate that the motor vehicle ownership rate for Ontario and, therefore, for the Wallaceburg Traffic Planning Study Area, will approach 2.0 ppmv by 1985.

Obviously, the projected 130% increase in motor vehicle registration will lead to ever-mounting travel demands throughout the urban area: these can only be satisfied by establishing new and improved trafficways, and by employing advanced, up-to-date operational techniques.

1.3 SCOPE AND PURPOSES OF STUDY

The study area comprises the Town of Wallaceburg and small adjacent portions of Chatham and Dover Townships. This is the area in which all urban development was projected to take place during the twenty-year study period.*

The recent closure of the old Centre Bridge to vehicular traffic was the primary reason for initiating this study. Thoughts concerning the location and size of a replacement crossing eventually led to more fundamental questions as to the actual need for any new bridge, and conversely, as to whether more than one is required. Because of this ever-expanding frame of reference, the decision was finally made to undertake a comprehensive traffic planning study for the area.

In addition to formulating river crossing proposals, study objectives may be detailed as follows:

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* Reference should be made to the Official Plan of the Wallaceburg Planning Area, to the Proposed Amendment (No. 1) to the Official Plan, and to the Official Plan Map. See also Exhibit 2.A, stored in a pocket inside the rear cover of this report.

- to establish a priority schedule of improvements which will keep pace with the Town's development. Proposals are arranged in sequence so that each will become a usable facility within the framework of the overall plan. Due consideration must be given to each project's physical and economic feasibility, and to its compatibility with the urban environment.

- to specify the orderly development of the major street system over the coming twenty years. The basis of the transportation "plant" in the small urban area is naturally the arterial and collector route network.

- to study various elements of the existing street network, and to propose intersection, roadway and operational improvements.

The principal aims of the Simplified Parking Study are:

- to determine locations, quantities and types of parking facilities available in Wallaceburg's central traffic district.

- to ascertain characteristics of parking space usage.

- to evaluate the effects of certain curb parking restrictions (required to increase traffic-carrying capacities of certain routes) upon overall parking space availability.

- to relate prevailing levels of space usage and supply, so that those general areas which exhibit parking space deficiencies may be discovered.

For certain elements of the improvement program, alternative schemes have been considered. Comparisons have been drawn among physical, operational and economic aspects before specifying recommendations.

Finally, the report stresses the importance of a continuing program of traffic counts and general data collection. This could pave the way for adjustments to the improvement schedule, made necessary by unforeseen changes in social and economic conditions.

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2.1 SURVEY METHODS

2.1.1 SUBDIVISION OF STUDY AREA

As shown on Exhibit 2.A, the Wallaceburg Traffic Planning Study area is subdivided into 30 origin and/or destination (O-D) zones. In plotting zone boundaries, an attempt has been made to achieve generally homogeneous land use within individual zones. However, boundaries cannot be based solely upon current land use, but must also reflect changes likely to take place during the twenty-year study period.

2.1.2 SURVEY PROCEDURES

2.1.2.1 Background Material

Considerable data obtained from governmental and private sources were reviewed. Items of particular relevance to the Traffic Planning Study included:

- tabulations of Average Annual Daily Traffic (AADT) and Average Weekday Traffic (AWDT) volumes recorded at the five external stations, numbered 501 to 505 inclusive, on Exhibit 2.A. Driver-interviews were conducted at these locations in connection with the External Origin and Destination Survey undertaken by the Ontario Department of Highways

- inventory of arterial and collector streets, prepared by the Town Engineer

- photogrammetric mapping at a scale of 1 inch=200 feet

- aerial photography at scales of 1 inch=2,000 feet, and 1 inch=450 feet (prepared by the Department of Mines and Technical Surveys, Government of Canada)

- plans of completed and proposed roadway improvements from the office of the Town Engineer

- Wallaceburg Police Department accident records for the years 1958 to 1964, inclusive

- the "Report on Traffic Study - Town of Wallaceburg" prepared by the Ontario Department of Transport in 1961.

- the "Official Plan of the Wallaceburg Planning Area", including Amendment No. 1 (1964) and various related exhibits, dealing with existing and projected land use and population

- data concerning the frequency of railroad crossing usage and delays, obtained from the Chesapeake and Ohio Railway Company Ltd.

- statistics giving the frequency of bascule bridge openings (i.e. closure to vehicular traffic), delay duration, and data covering navigation clearances, etc. obtained from the County of Kent, from the Harbours and Rivers Engineering Branch of the (Federal) Department of Public Works, and from the Southwestern Sales Corporation Limited

- statistics concerning growth in population and motor vehicle ownership provided by various provincial and federal government agencies.

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In order to appraise current traffic movements and travel habits in the Wallaceburg area, various field surveys were conducted on business days during August 1964.

2.1.2.2 <u>Internal Origin and Destination Survey</u>

Northbound drivers on the Lord Selkirk Bridge and westbound drivers on the Dundas Bridge were interviewed between 7:00 a.m. and 8:00 p.m. The number of people in the vehicle and the vehicle type (e.g. car, light or heavy truck, bus, etc.) were recorded, and the following questions were asked of the driver:

> "Where did this trip begin (i.e. where was your last stop)?"
>
> "Where will this trip end (i.e. where will you stop next)?"
>
> "What is the purpose of this trip (e.g. work, shopping, personal business, etc.)?"

It was particularly important to obtain accurate answers to the first two questions, so that trip ends could be assigned to individual O-D zones or highway routes (e.g. street address or store/factory name, if inside Wallaceburg).

Only very infrequently was it not possible to complete an interview because of a driver's refusal to answer; the friendly cooperation tendered by the great majority of citizens was most gratifying!

Vehicular classification counts were taken during the interview period for each direction of travel: in addition, several traffic volume (ATR) counts were made on nearby major streets. These counts provided a basis for expanding interview data to represent two-directional, 24-hour movements.

Obviously, travel desires spanning one or both branches of the Sydenham River are key elements in the Wallaceburg area's trip pattern: indeed, as stated earlier, the present traffic planning study was initiated primarily to deal with such movements. These considerations led to the choice of interview station locations.

2.1.2.3 Pedestrian Origin and Destination Survey

This was undertaken at the Centre Bridge - now used only by pedestrians - between 7:00 a.m. and 8:00 p.m. on one business day. The purpose was to ascertain the number of persons who park their vehicles south of the river and then walk to the principal shopping and commercial area of the Town.

Only those who drove to the south side of the Sydenham River before crossing the footbridge were interviewed; i.e. only within this group may be found those who may have changed their travel habits because of the Centre Bridge closure.

In order to make sure that only those who drove to the south side were included in the survey, interviewers approached every pedestrian of apparent driving age. The following questions were asked:

> "Including yourself, how many persons were in your car?"
>
> "Where did the trip begin?"
>
> "Where will this trip end (i.e. where are you walking to)?"
>
> "What is the purpose of this trip?"

"Before this bridge was closed to (vehicular) traffic, did you usually drive into the main business area, or did you park on the south side and walk?"

2.1.2.4 Traffic Volume Counts

Automatic traffic recorders (ATR) were installed at 43 locations on the major street system of Wallaceburg.

Two (ATR) control stations were located at the two vehicular bridges, which were also the sites of internal O-D survey stations. Both Dufferin Avenue/ McNaughton Avenue and Margaret Avenue/James Street are King's Highway Connecting Links, and function as arterial routes.

The Lord Selkirk Bridge (and Highway No. 40) connects Wallaceburg with Chatham and Highway No. 401, and represents the only roadway link between the southern portion of the Town and its major industrial and commercial areas. The Dundas Bridge lies at the eastern end of Wallaceburg's principal shopping thoroughfare, i.e. at the beginning of the James/ Wellington one-way "couplet". This crossing is the only connection between the rapidly developing north-eastern section of the Town and the bulk of the urban area. The route is particularly vital, in that it provides access to the Sydenham District Hospital, which serves not only Wallaceburg but a large surrounding rural area.

In addition to the two control counter locations and one operated for seven days on James Street between Creek and Duncan Streets, 40 ATR were operated at as many locations, each for at least 24 hours. Such counts always included at least one typical business day.

2.1.2.5 Intersection Turning Movement Counts

These were manually recorded at 16 of Wallaceburg's more heavily used intersections, during the 3:00 p.m. to 6:00 p.m. peak traffic period on business days. Intersection leg and approach volumes were compared with calculated approach capacities in order to determine volume-capacity ratios. This technique, in turn, led to a review of those sources of congestion peculiar to each location, and ultimately, to improvement proposals. Furthermore, these counts supplemented the ATR counts mentioned above.

2.1.2.6 Physical Surveys of Intersections

Condition diagrams were prepared for all major intersections (i.e. those at which turning movement counts were taken) in order to provide a diagrammatic basis for capacity calculations. All elements which influence traffic capacity were noted, including signs, signals, utility poles, pavement and sidewalk widths, visibility restrictions and miscellaneous "street furniture".

Diagrams were supplemented by an extensive series of study photographs taken at each intersection approach, and at sites of potential roadway improvements.

2.1.2.7 Speed and Delay Survey

For all arterial and collector routes, average speeds and travel times were measured and principal causes of delay and congestion were described.

After plotting survey routes on a street map, a driver, equipped with stop-watch and portable tape recorder, was dispatched to cover each route at least six times (three times in each direction) in a passenger car. Runs were made during morning, midday and afternoon peak traffic periods on business days, in order to arrive at average measurements of route speed and delay.

Survey drivers were instructed to keep within legal posted speed limits, and to drive at all times with care and discretion. Only by so doing could "average driving conditions" be simulated, and hence, average speeds and travel times ascertained.

2.1.2.8 Parking Space Inventory and Usage Survey "Simplified Parking Study"

In effect, this may be considered a unified and functionally independent project. However, it must be emphasized that the Parking Study cannot be divorced technically from the overall Traffic Planning Study, as results of the former will often influence the design of certain improvement proposals.

A detailed survey was made of all curb and off-street parking facilities within the central traffic district. Parking restrictions, fees, meter time limits, and nature of curb usage (with lineal dimensions of individual sections) were all recorded.

The parking usage study was carried out on a series of normal business weekdays. Twelve surveillance routes were laid out, and all curb and off-street parking spaces were checked at half-hourly intervals between 10:00 a.m. and 6:00 p.m. For all occupied spaces, partial license numbers were recorded, so that parking durations could be determined for each vehicle observed.

2.1.2.9 Parking Cordon* Counts

Person and vehicle movements into and out of the central traffic district were recorded between 8:00 a.m. and 6:00 p.m. on normal business days, during the parking usage survey: the counting schedule ensured that each cordon crossing point was covered once. Such counts formed the basis of all CTD accumulations, portrayed by Exhibit 2.H.

A total of 18 counting stations was established. At 14 of these, two-directional ATR counts were supplemented by manual, two-directional vehicle classification and person counts (including pedestrians), while at the remaining four locations -- on minor local streets -- only ATR counts were conducted. For the latter, assumed directional "splits" were based upon summarized inbound and outbound movements recorded manually at the 14 other stations.

Since the Dundas Bridge O-D survey station is situated on the CTD cordon, person and vehicle tallies taken during the course of the O-D survey also became elements of the parking cordon count.

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* The parking cordon surrounds the central traffic district; i.e. O-D zones 110, 120, 130, 140 and 150. Hence, in this context, the terms "CTD cordon" and "parking cordon" may be considered synonymous.

2.2 TRAFFIC CHARACTERISTICS - 1964

2.2.1 STREET AND HIGHWAY NETWORK

The uniform rectangular grid characteristic of township subdivision (represented by such routes as Dufferin Avenue, Libby Street, Base Line, Third Concession and Forhan Street) is disrupted by waterways in and around Wallaceburg. Although the Town's street pattern is still based upon a series of grids, the influence of the Sydenham River upon route orientation is quite marked. Exhibit 2.A* indicates how Wallace Street and the James Street/Margaret Avenue route closely follow the river's undulating course.

Due to the angular separation of various portions of the street network, certain routes (e.g. McNaughton Avenue and, in a sense, Dufferin Avenue itself) assume radial functions. As the built-up area continues to grow, such routes will become ever more important as connections between residential areas and the central business district.

As indicated previously, the vehicular bridges across the Sydenham River and the North Branch are of paramount importance to the movement of traffic within and through Wallaceburg. It is therefore evident that those streets which lead directly onto the Lord Selkirk and Dundas Bridges are the most important arterial routes serving the Town: indeed, these bridges are vital links in the King's Highway network of Southwestern Ontario. Consequently, the loss of the Centre Bridge as a vehicular crossing has not caused major disruption of traffic flow on the arterial and collector street system of Wallaceburg. Those roads forming the approaches to this structure long ago ceased to function as major through routes, because of restricted right-of-way, relative narrowness, indirectness and discontinuity.

One-way streets are important elements of the Town's major route system. James and Wellington Streets represent a classic example of the one-way "couplet", established to increase traffic capacity in this strategic east-west corridor, and to simplify operations at the Dufferin/James/Lisgar/McNaughton/Wellington intersection complex. Most other one-way route segments are quite short, and generally serve to relieve congested intersections and to eliminate potentially hazardous traffic stream conflicts.

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* Stored in a pocket inside the rear cover of this report.

James Street, between Creek and Fork Streets, becomes the typical commercial-institutional "main street". It is a pleasant shopping street, affording several views of the Sydenham River, and an especially attractive haven at its easterly end in the form of the Library Park. James Street is called upon to provide almost continuous curb parking on both sides, and to carry inordinately heavy volumes of long - and intermediate - distance traffic. In addition, a large number of "circulating trips",* are forced onto James Street, thus further reducing its efficiency as a traffic artery and shopping promenade.

Forhan Street is the principal route serving the western portion of the Town's industrial area. Its alignment is direct, as it is an element of the original township grid. The possibility exists that Forhan Street may be closed in the vicinity of the Dominion Glass Company Ltd. due to plant expansion: if and when this happens, the arterial function of Forhan Street will have to be transferred to a new route.

It is obvious that railroad grade crossings contribute to delay in the orderly movement of people and goods through and within a municipality. Detailed references to Wallaceburg's principal grade crossings will be made later, but it may be observed here that these do not represent a major obstruction to traffic flow, as only one rather lightly used single-tracked railway passes through the Town.

To sum up, it is obvious that Wallaceburg is served by a reasonably efficient major route network, which can become the basis of an improved and expanded arterial and collector system. Elgin Street represents a convenient east-west by-pass of the CBD, while other well-aligned routes serve important residential and industrial precincts. Although certain streets in the older sections of the Town have relatively narrow roadway allowances and meet at awkward intersections, few physical obstacles of any significance stand in the way of providing a major route system adequate to meet Wallaceburg's current and foreseeable future needs.

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* Circulating trips arise from two sources:

(a) "cruising" in search of parking accommodation;

(b) changing direction on the one-way street system in order to complete a "round trip".

2.2.2 TRAFFIC FLOW PATTERNS

On Exhibit 2.B, daily and hourly traffic variations at three locations on the major street system are compared: these represent routes of various classifications serving different combinations of trip types.

2.2.2.1 Dundas Bridge:

- King's Highway route; major arterial.

- Connects residential areas with CBD.

- Relative lack of pronounced peaks indicates varied trip purposes and travel desires. Since periods chosen for trips of varying purpose do not generally coincide, relatively heavy volumes are carried throughout the day; hence, peaks tend to be levelled off.

- Peak hour accounts for 8.4% of total 24-hour flow.

  Peak hour factors for bridges are largely dependent upon the capacities of feeder routes in general, and of nearby intersections in particular: capacity calculations indicate that all such feeder routes and most intersections - as well as the bridge itself - operate below both Possible and Practical Capacities (see Appendix H).

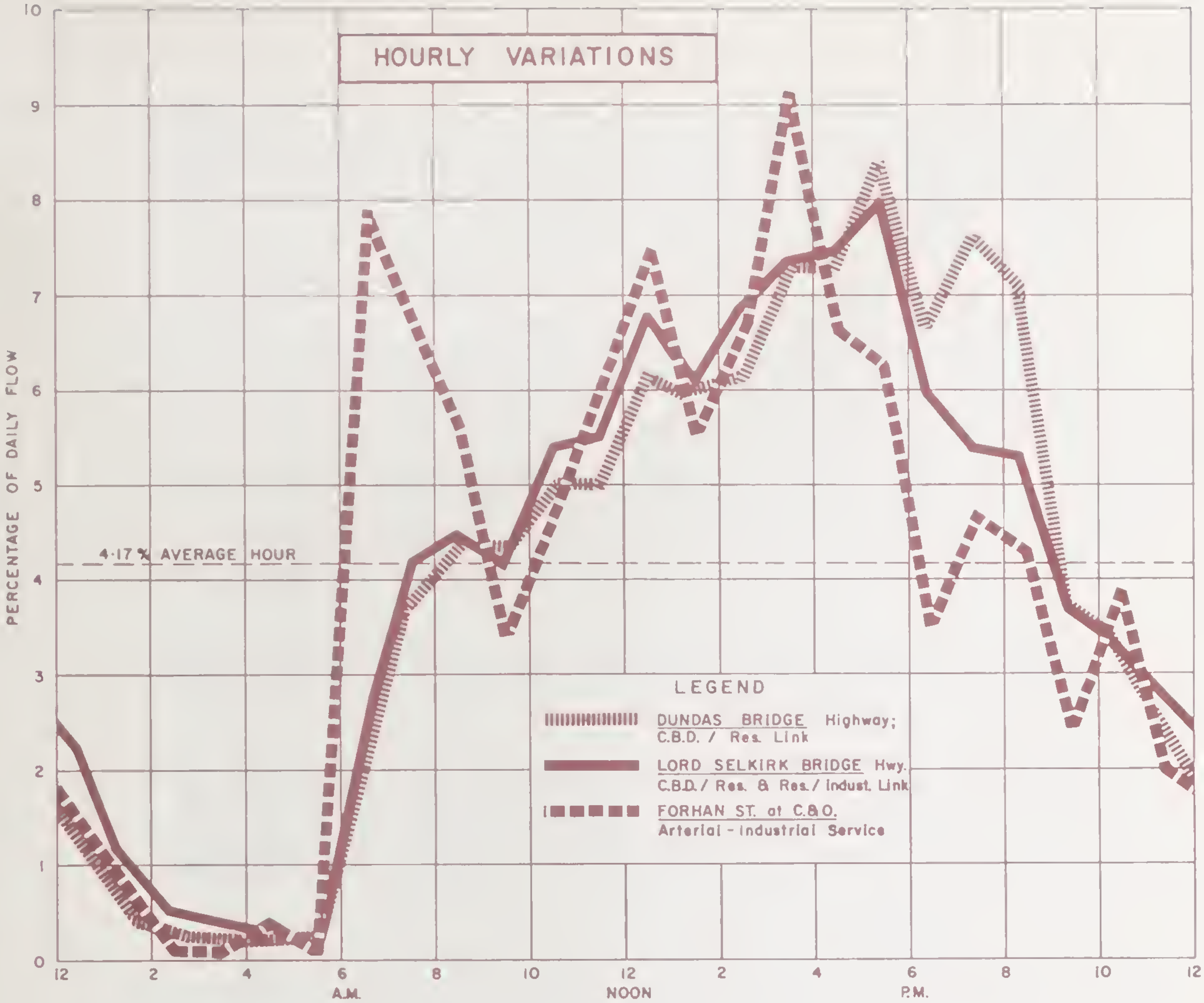
- Secondary peak occurs during early evening (7:00-8:30 p.m.). This is the only route serving the Sydenham District Hospital, and many trips are made to take advantage of evening visiting hours. Also, east end residents are required to use this route for social/recreational trips into and beyond the CBD.

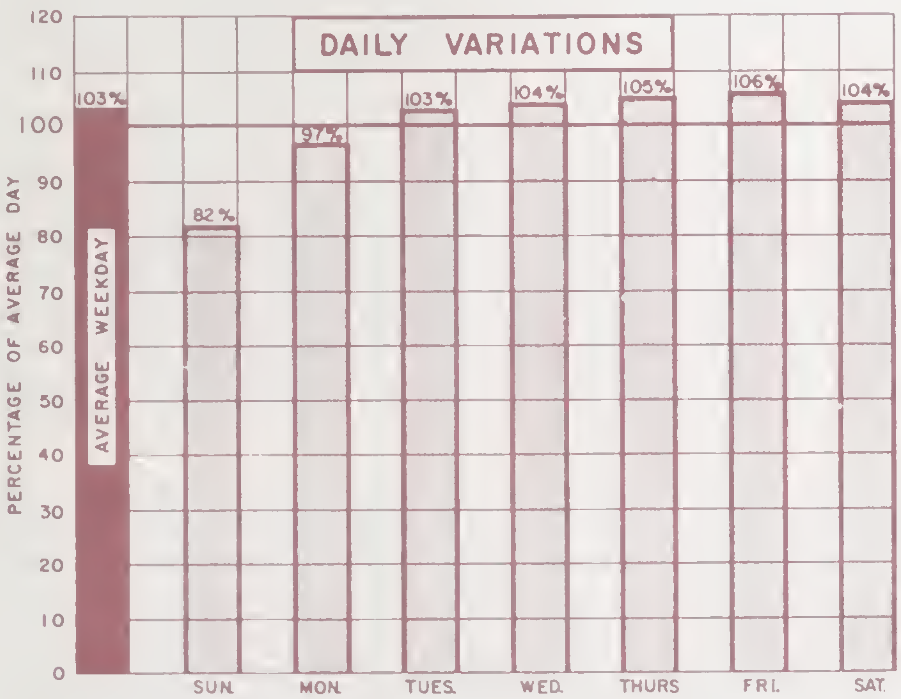
2.2.2.2 Lord Selkirk Bridge:

- King's Highway route; major arterial.

- Connects extensive industrial and residential areas with CBD and with larger portion of Town north of Sydenham River.

- Pattern quite similar to that observed on Dundas Bridge, for similar reasons. However, the relatively heavy evening volumes characteristic of former loca-





TRAFFIC VARIATIONS

tion are not evident here (i.e. hospital visitors are not concentrated on this route, and many residents park in the McDougall/Wallace vicinity and walk across the Centre Bridge).

- Peak hour accounts for 8.0% of total 24-hour flow. Again, no alternative route exists but capacity is somewhat restricted by the intersections north and south of the structure (refer to footnote regarding the Dundas Bridge peak hour factor).

2.2.2.3 Forhan Street at Chesapeake and Ohio Railway Crossing:

- Arterial route serving major industrial area.

- Continuous, well-aligned route. Relatively small number of intersections and driveways contributes to low marginal friction.

- Very pronounced peaks coincide with shift changes at industrial plants. Volumes are quite low at other times of day, indicating that route is used almost exclusively by plant-generated work trips.

2.2.2.4 General:

Maximum flows at all three locations occur during the afternoon peak period. While it may often appear that midday activities generate traffic volumes equal to or even greater than afternoon peak volumes, Exhibit 2.B indicates the contrary. Admittedly, substantial midday flows are discernible on all routes: this is typical of the small urban area, and well illustrates not only the widespread desire to go home for the noon meal, but more important, the practicability of doing so. On the other hand, morning peaks are seen to be relatively moderate, and in nearly all cases are far less intense than afternoon or even midday peaks. Apparently, a large number of essential trips (i.e. work trips) take place during a relatively short period of the afternoon.

The average peak hour factor for the arterial route network is 9.0%. The range extends from a low of 7.0% on McNaughton Avenue (Highway No. 40) at the Chesapeake and Ohio Railway, to a high of 11.3% on Forhan Street north of Libby Street. Since highway traffic is not characterized by pronounced peaks, but rather by fairly even flow throughout the day, it seems logical to

expect that low peak hour factors will be observed on highway routes. Conversely, routes such as Forhan Street, which serve concentrated industrial or commercial areas, carry large volumes of work trips during short periods, and thus exhibit relatively high peak hour factors.

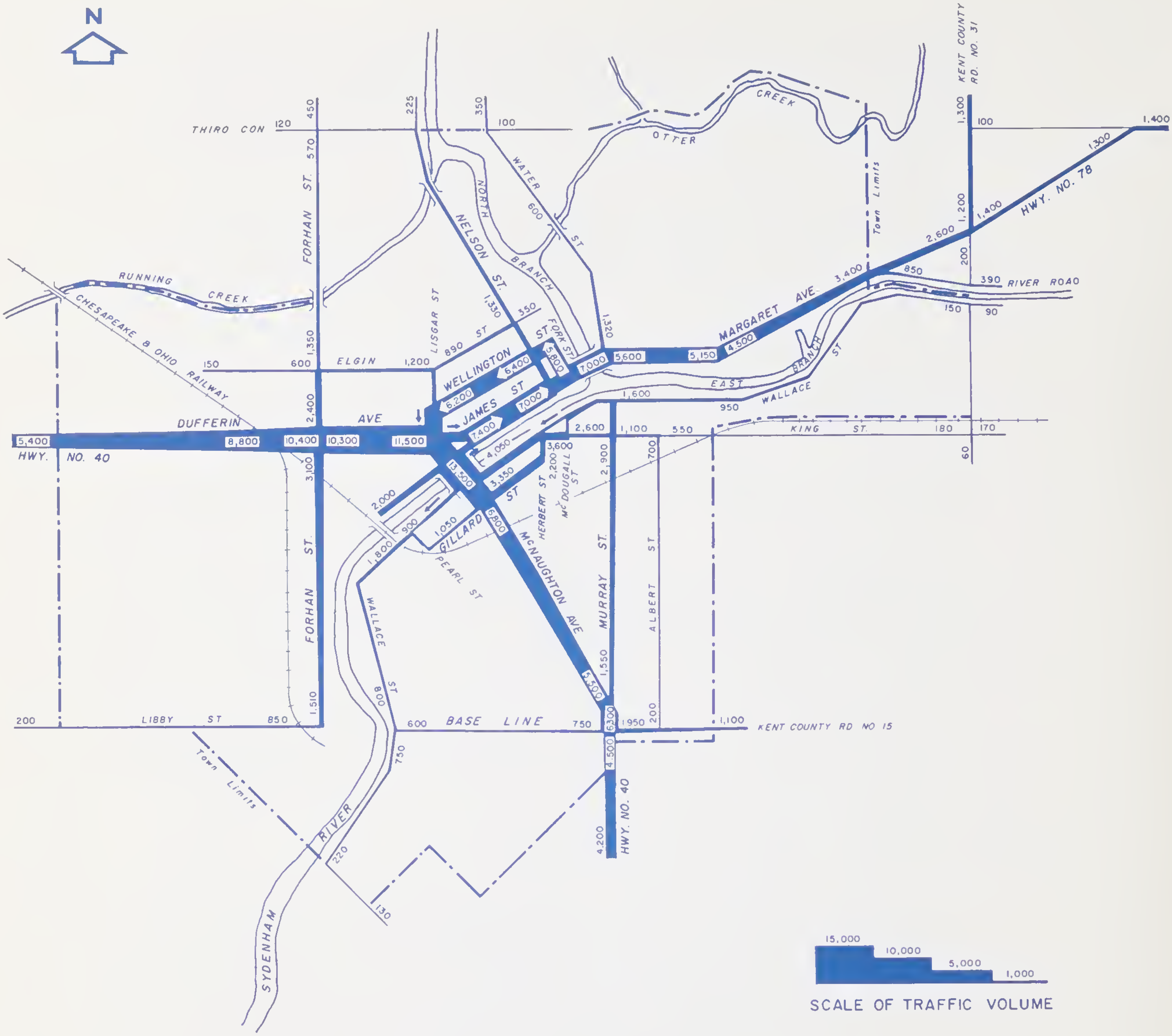
The collector (and distributor) routes which, by definition, conduct groups of local movements to or away from arterial routes, usually exhibit high peak hour factors. The average for Wallaceburg's collector system is 10.6%, with values ranging between 7.5% and 15.8%. Flows are strongly influenced by peak period demands, as such routes are not subject to the relatively heavy day-long pressures imposed upon most arterials.

Exhibit 2.B also portrays daily variations in traffic flow on the arterial route system (i.e. values are derived from ATR counts taken at both control stations). As expected, the highest 24-hour totals were recorded on Fridays, due to extended shopping hours and to intensified social/recreational activities. Generally, higher volumes were recorded late in the week, although traffic movements on Saturdays do not commonly exhibit the pronounced peaks so typical of weekday (i.e. Monday to Friday inclusive) flow patterns. Hence, the study of street network operation under weekday peak conditions is basic to the realistic appraisal of existing facilities.

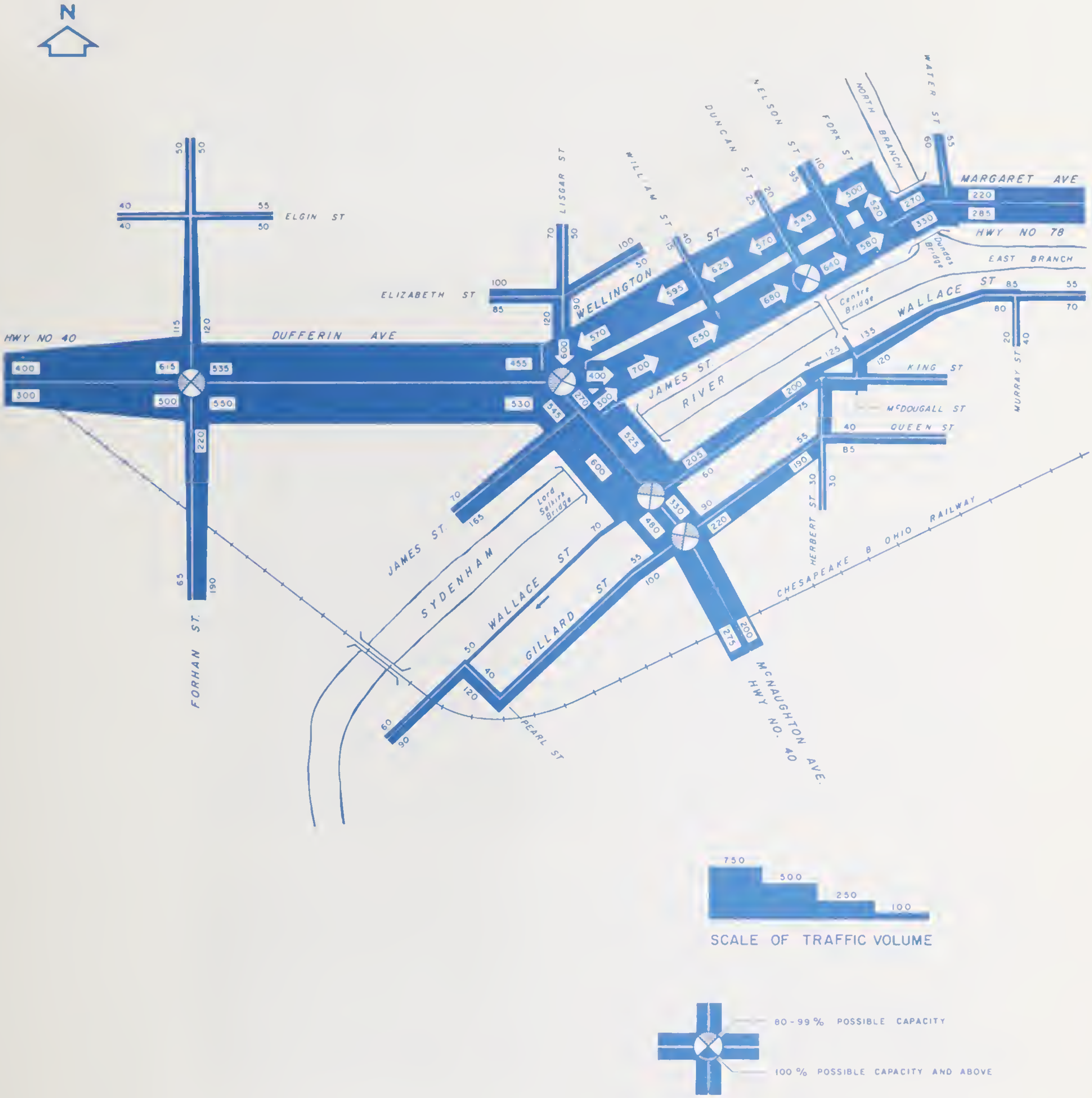
2.2.3 TRAFFIC VOLUME AND CAPACITY

The highest individual route volumes in the Wallaceburg area occur on Dufferin Avenue and on the Lord Selkirk Bridge, although it may be noted from Exhibit 2.C that the James/Wellington one-way "couplet", which represents a single divided facility through the central business district, is even more heavily loaded. Indeed, the heaviest flows are recorded on the King's Highway routes - key elements of the Town's major street network.

The adjacent intersections of Dufferin/Lisgar/McNaughton and James/McNaughton mark the confluence of Wallaceburg's heaviest traffic flows. To complicate matters, the western half of James Street carries a substantial volume of industrial traffic - including many large trucks - generated by the Dominion Glass Company Ltd. installations. Efforts have been made to



AVERAGE WEEKDAY VOLUMES



DIRECTIONAL PEAK HOUR VOLUMES

CENTRAL TRAFFIC DISTRICT AND VICINITY

ease congestion and segregate conflicting traffic streams by means of channelization and one-way operation: the principal leg of this complex is the Lord Selkirk Bridge, which accommodates the heaviest traffic volumes observed on any single two-way section of Wallaceburg's major route system.

Forhan Street is the only major north-south arterial route serving the western portion of the Town. South of Dufferin Avenue, it is primarily an industrial access route of strategic importance to all plants north (i.e. west) of the Sydenham River.

South of the river, Wallace Street, supplemented by Gillard Street, is the most heavily used east-west route. It connects industrial and residential areas at its south-western and eastern extremities respectively, with Highway No. 40 and the southerly edge of the Town's CBD.

Capacity analyses were undertaken at 16 of Wallaceburg's most heavily used intersections, including the three presently controlled by traffic signals. As specified by Appendix H, and as portrayed graphically by Exhibit 2.D, there are presently five intersections where one or more recorded approach volumes exceed 80% of Possible Capacity at peak periods; indeed, at one location, Possible Capacity is actually exceeded. Under such conditions, drivers encounter the familiar "stop and go" situation, and are unable to clear the intersection either during one green signal phase (at signalized intersections), or until a lengthy stop sign delay has ensued.

Capacity deficiencies could be virtually eliminated by prohibiting curb parking along intersection approaches. Such restrictions would represent an insignificant percentage of central traffic district parking accommodation, and would entail only modest capital expenditures (e.g. appropriate signs, radio and newspaper publicity, etc.). Restricted areas 60 to 100 feet in length would make possible the designation of additional lanes at intersection approaches.

Under urban traffic flow conditions, the key to efficient circulation is adequate intersection capacity. Sections of roadway between intersections can normally handle considerably higher volumes than those which can be passed through intersectional "bottlenecks".

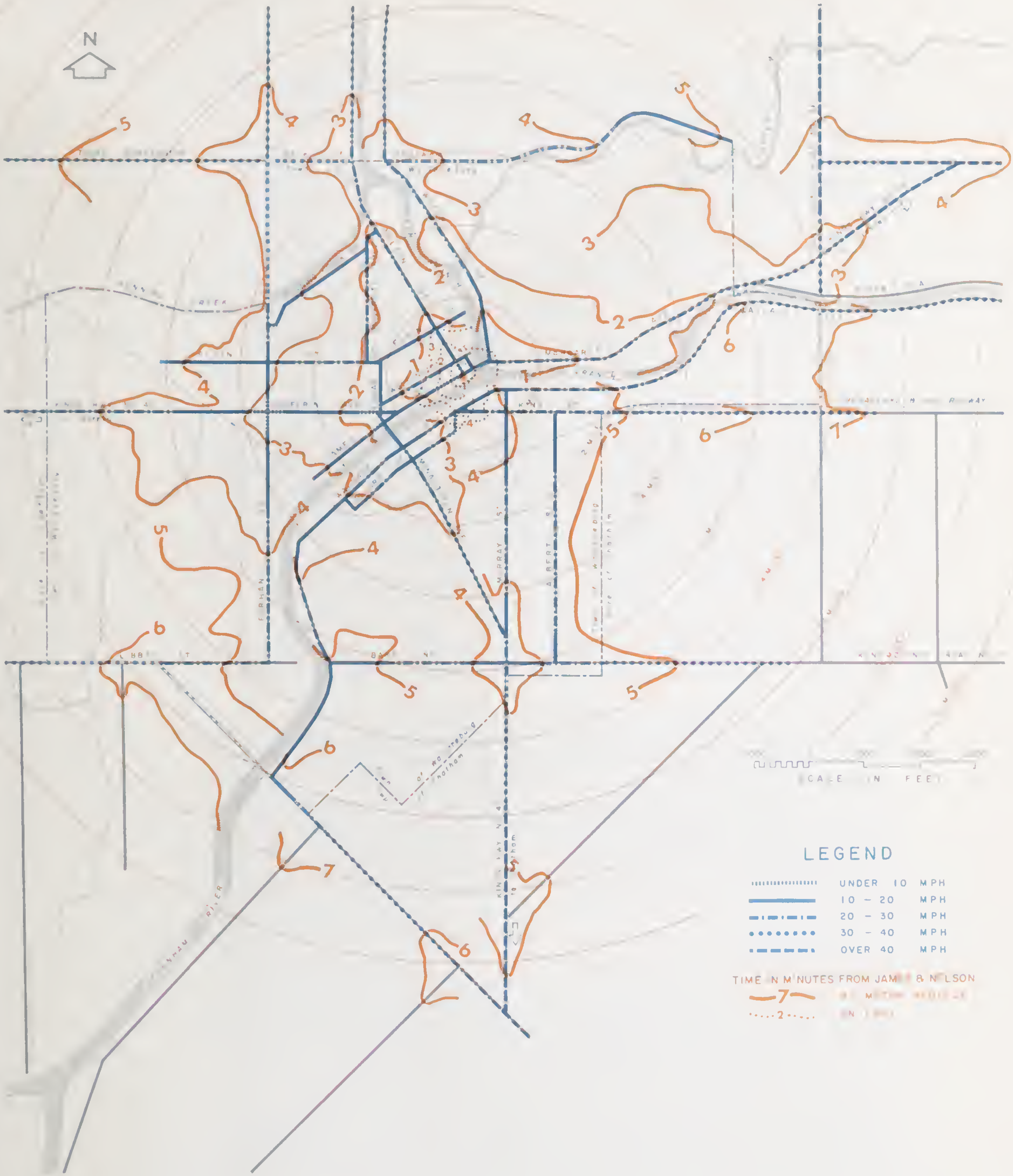
To sum up: there are very few locations where problems become apparent. Wallaceburg is fortunate in having an efficient major route network as the basis for expansion and improvement: moreover, streets are well oriented to service existing and projected developments. As indicated by Exhibits 2.C and 2.D, the heaviest flows observed in the Wallaceburg area pass through and adjacent to the central business district. This situation is expected to persist even as the urban area spreads, due to the relative positions of highway routes, watercourses and the CBD.

2.2.4 TRAVEL TIME, SPEED AND DELAY ON MAJOR ROUTES

2.2.4.1 General

Exhibit 2.E indicates that all points within the study area which can be reached by motor vehicle lie within seven minutes' travel time of the James/Nelson intersection. It is also apparent that most presently built-up areas are only three or four minutes away from the heart of the CBD, during peak traffic periods on a typical business day. However, due to the eccentric position of the Lord Selkirk Bridge with respect to the south-eastern portion of the Town, at least six minutes are required to reach points on Wallace Street, King Street and Kent County Road No. 15 near the easterly Town Limit.

This Exhibit also indicates average operating speeds on arterial and collector routes: generally, these are quite acceptable for an urban area of this size and form. Widely accepted standards for major route peak hour speeds range between 20 and 30 m.p.h. for routes outside the central traffic district, and between 15 and 20 m.p.h. for "downtown" routes: Exhibit 2.E indicates that speeds below 10 m.p.h. were noted on certain route segments in the more congested areas. At the Dufferin/Lisgar/McNaughton intersection, the complex flow pattern gives rise to virtually chronic congestion, and hence, to low speeds. Also, that portion of James Street passing through the Town's principal shopping and commercial precincts cannot be expected to function efficiently as a major arterial route. It is a relatively narrow street, lined on both sides with curb parking spaces subject to rapid turnover (i.e. leading to further delays, caused by parking and unparking manoeuvres), and is also the scene of heavy pedestrian movements - indeed, mid-block "jay-walking" is quite common. Furthermore,



PEAK PERIOD

TRAVEL TIMES AND ROUTE SPEEDS

the maze of overhanging signs and multi-coloured pennants often tend to obscure traffic signal indications at Duncan Street.

Actual speeds attained on all sections of Wallaceburg's major route system, in addition to reasons for delays, are specified in Appendix E. These brief monographs are significant, as they suggest improvements - often of a minor nature and thus quite inexpensive - which could improve area circulation. Indeed, in certain instances, these data have been utilized in evaluating priorities for recommended long-term improvements.

2.2.4.2 Bascule Bridges

It is recognized that the form of Wallaceburg has been dictated largely by the waterways which interlace the area. Hence, it follows that bridges have been and will continue to be strategic elements of the area's circulation system. Any interruption to roadway traffic occasioned by opening bascule bridges to accommodate water traffic, must be considered when assessing travel time and delay characteristics.

Appendix J indicates that summer weekends, when both river and road traffic become heavy, are critical periods.

The Dundas Bridge is very rarely opened, for no large vessels ply the North Branch of the Sydenham River. Admittedly, the Lord Selkirk Bridge spans a heavily used waterway, and the quite frequent bridge openings do occasion noticeable breaks in the continuity of traffic flow on this vital highway and arterial route. Under present conditions, however, these delays are far from intolerable. Actual peak traffic periods (i.e. "rush hours") are of very short duration in Wallaceburg, and any traffic back-ups which do occur on approaches to the Lord Selkirk Bridge are dispersed quite rapidly. Indeed, delays commonly experienced at the nearby Dufferin/James/Lisgar/McNaughton intersection complex are far more disruptive from the standpoint of increased area-wide travel time and trip duration.

Nevertheless, as the urban area grows, and the use of both road vehicles and waterborne craft increases, more frequent bridge openings could result in seriously impeded traffic flow. It should be emphasized that

the Lord Selkirk Bridge represnets the only vehicular connection between the rapidly developing southern portion of the Town, and the major commercial, industrial and residential areas north of the Sydenham River. In addition, the bridge functions as a key element of the provincial highway network, and provides the only outlet to the south - to Chatham and to Highway No. 401.

2.2.4.3. Railroad Grade Crossings

These commonly represent a particularly undesirable and dangerous cause of traffic delay, and are all too frequently encountered on the North American urban scene. Generally, when main line railroads and principal arterial roads intersect at grade, no effort should be spared to achieve grade separation as quickly as possible, when appropriate warrants arise. However, the single-tracked Chesapeake and Ohio Railway which passes through Wallaceburg is not a heavily-used main line: Appendix J indicates that grade crossings are seldom occupied more than six times daily, and that individual crossing delays do not exceed five minutes.

In addition, several of the switching and through rail movements occur at night, when traffic volumes are negligible.

No generally accepted volumetric or accident warrants for grade separation are even closely approached in the Wallaceburg area today (refer to Appendix J, Part II: Note (3)). Moreover, it is apparent that unless railway and/or roadway usage levels undergo drastic and totally unforeseen changes, none of the present crossings should require grade separation during the 20-year study period.

2.2.5 TRAFFIC SAFETY

2.2.5.1 General

As a small urban area develops, traffic accidents and traffic safety in general demand ever more attention from both Police and Engineering Departments. Simply stated, as a town grows its traffic and safety problems generally worsen, sometimes disproportionately when viewed in the light of absolute population increase. Hence, a safe environment for pedestrians and drivers in a growing Wallaceburg can only be main-

tained by means of intensified surveillance and prompt attention to difficulties as they arise.

Annual accident reports were received from the Wallaceburg Police Department, and Exhibit 2.F presents a summary of accident experience for the years 1958 to 1964, inclusive.

Obviously, such relatively low annual accident totals will not lead to a reliable trend. It must also be remembered that figures are based upon absolute totals only, and thus, are not influenced by vitally important factors such as accident type, cause and severity. Therefore, in the case of small urban areas, it would appear logical to concentrate analysis and corrective action at specific locations where unusually large numbers of accidents occur. Incidentally, it may be noted from accident records that signal control of an intersection does not guarantee safety. Careful surveillance is thus required, in order to ascertain whether signal warrants are being satisfied, and whether changes in signal phasing may be justified.

It was noted that total annual assessed damages, due to motor vehicle accidents have risen dramatically since 1962, while the annual number of accidents has varied little since 1958 - the first year for which statistics have been recorded here. Unfortunately, this situation only reflects the nation-wide trend: motor vehicles become ever larger, more complex, more powerful, more expensive to buy and operate - and thus more expensive to repair, when even relatively minor damage is incurred.

2.2.5.2 Accident Locations

The Wallaceburg Police Department prepares an accident spot map each year, indicating locations of all personal injury and property damage accidents which occur on the Town's street system. A review of the 1964 map showed certain intersections and roadway sections to be "high accident-frequency locations", and it is felt that brief comments concerning these would be useful at this juncture:

- James Street between Creek and Nelson Streets

  Principal commercial area of the Town. Delay and congestion frequently observed. 20 accidents occurred during 1964.

TRAFFIC ACCIDENTS

Annual Statistics - 1958 to 1964 Inclusive

Year	Total Accidents*	Total Assessed Damages (dollars)	Population of Wallaceburg (estimated within New Town Limit)	Accidents per Thousand Residents
1958	200	23,750	8,800	23
1959	177	30,260	9,100	19
1960	139	27,240	9.300	15
1961	126	22,550	9,600	13
1962	144	28,180	9,900	15
1963	192	35,500	10,200	19
1964	177	42,285	10,500	17
Average-1958-1964	165	29,966	9,630	17**

* Total number of reportable accidents on public roadways within Town Limits, investigated by the Wallaceburg Police Department and by the Ontario Provincial Police.

** 1963 Accidents per thousand residents, for all Ontario urban centres
- with populations between 1,000 and 10,000: 9
- with populations greater than 10,000: 16

Mainly rear-end and side-swipe collisions caused by:

parking and unparking manoeuvres,

intersection turns suddenly interrupted by pedestrian movements,

lane-changing without warning on one-way street, either to pass slow vehicle or vehicle leaving/entering parking stall, or to attain proper position for intersection turn,

confusion arising from maze of signs, suspended pennants, etc. which restrict visibility, and partially obscure traffic signals at Duncan Street.

****

- <u>Dufferin/Lisgar/McNaughton and James/McNaughton intersections, including north approach to Lord Selkirk Bridge</u>

Most heavily used intersections in the Town. Delay and congestion frequently observed. 15 accidents occurred during 1964.

Mainly rear-end collisions caused by:

inattention to multi-phase traffic signal and to part-time turn prohibitions,

very sharp turning radii imposed upon certain movements (e.g. McNaughton northbound to James eastbound), causing sudden slow-downs,

narrowing of McNaughton Avenue pavement just south of Dufferin Avenue, necessitating rapid merge of heavy traffic flows,

traffic signals not being visible to northbound drivers until the high point of the bridge roadway profile has been reached,

slippery conditions on steep bridge approaches during winter months.

****

- <u>Dufferin/Lorne/Johnston intersection</u>

  Johnston Street approach is poorly aligned with respect to Dufferin and Lorne Avenues. 9 accidents occurred during 1964.

  Mainly rear-end and side-swipe collisions caused by:

    skewed intersection approach, necessitating awkward, slow turns from Dufferin Avenue,

    poor visibility afforded northbound and southbound drivers approaching Dufferin Avenue.

****

- <u>Dufferin/Forhan intersection</u>

  Substantial number of large trucks pass through this intersection to gain access to industrial areas. 7 accidents occurred during 1964.

  Mainly broad-side and side-swipe collisions caused by:

    Dufferin Avenue traffic "running" the amber and red signal indications, leading to collisions with north/south-bound vehicles,

    poor placement of traffic signal heads,

    sudden narrowing of Dufferin Avenue pavement west of Forhan Street, causing traffic flow "squeeze",

    vision of automobile drivers often being obscured by large trucks executing turns.

****

- <u>McNaughton/Wallace intersection</u>

  Immediately south of Lord Selkirk Bridge approach. 7 accidents occurred during 1964.

  Mainly rear-end collisions caused by:

    southbound vehicles slowing down to make left and right-hand turns at Wallace Street,

    narrowness of McNaughton Avenue pavement, which does not allow southbound vehicles to pass those turning either right or left at Wallace Street,

vehicles turning left and right from Wallace Street (westbound), whose drivers tend to be somewhat impulsive after lengthy peak period delays.

2.2.6 CENTRAL TRAFFIC DISTRICT CORDON CROSSINGS AND ACCUMULATIONS

2.2.6.1 Cordon Crossings and Trip Purposes

Results of the cordon count are presented in Appendix K, which indicates vehicle and person totals by hour and by route. Proportions of commercial vehicles (trucks and buses) by route are also given: it is seen that the maximum percentage recorded on a major arterial route was 5.8%, on the Dundas Bridge, and that the average was 4.2%. These rather low figures, and other observations made during the survey, suggest that truck operations do not seriously impede traffic circulation in downtown Wallaceburg.

Total vehicle and person movements indicated in Appendix K seem, at first glance, quite excessive for a Town whose population is less than 11,000. These figures prove that many people (and hence, many vehicles) make several trips to, from or through the CTD each day. The tabulation also indicates the relative importance of each route, by means of percentage of total cordon crossings carried. It is seen that the James/Wellington one-way "couplet" is very definitely the backbone of the street network in the northerly portion of the CTD, while Wallace Street performs a comparable function south of the Sydenham River (refer also to Exhibits 2.C and 2.D).

In summary, it may be stated that the CTD is served by a relatively efficient combination of major and minor streets, whose relative spacing and orientation lead to an orderly separation among arterial, collector-distributor and local service functions.

****

There remains little doubt concerning the importance of the basic street network, in transporting people and goods by means of private vehicles. This is especially apparent in smaller urban areas such as Wallaceburg, where no public transit services are operated. Average vehicle occupancies, extracted from the ten-hour manual cordon counts, were as follows:

Private passenger vehicles	-	1.39 persons per vehicle
Commercial vehicles (trucks)	-	1.08 persons per vehicle

These figures are typical of towns in this population group, and no significant changes are anticipated.

****

Purposes of private vehicle trips taking place within Wallaceburg throughout an August 1964 business day (7:00 a.m. to 8:00 p.m.), are summarized on Exhibit 2.G.

2.2.6.2 Accumulations of Persons and Vehicles

Starting values (i.e. for 8:00 a.m.) shown in Exhibit 2.H were obtained by making rapid manual counts from a vehicle, moving through the CTD, on a series of typical weekday mornings between 7:45 and 8:00 a.m.: accumulation curves themselves are based upon the CTD cordon counts described earlier. Totals rise rapidly between 8:00 and 10:00 a.m., and tend to level off until midday, when the familiar lunch-hour "exodus and return" results in an actual decline in vehicle accumulation between 11:30 a.m. and 1:30 p.m.

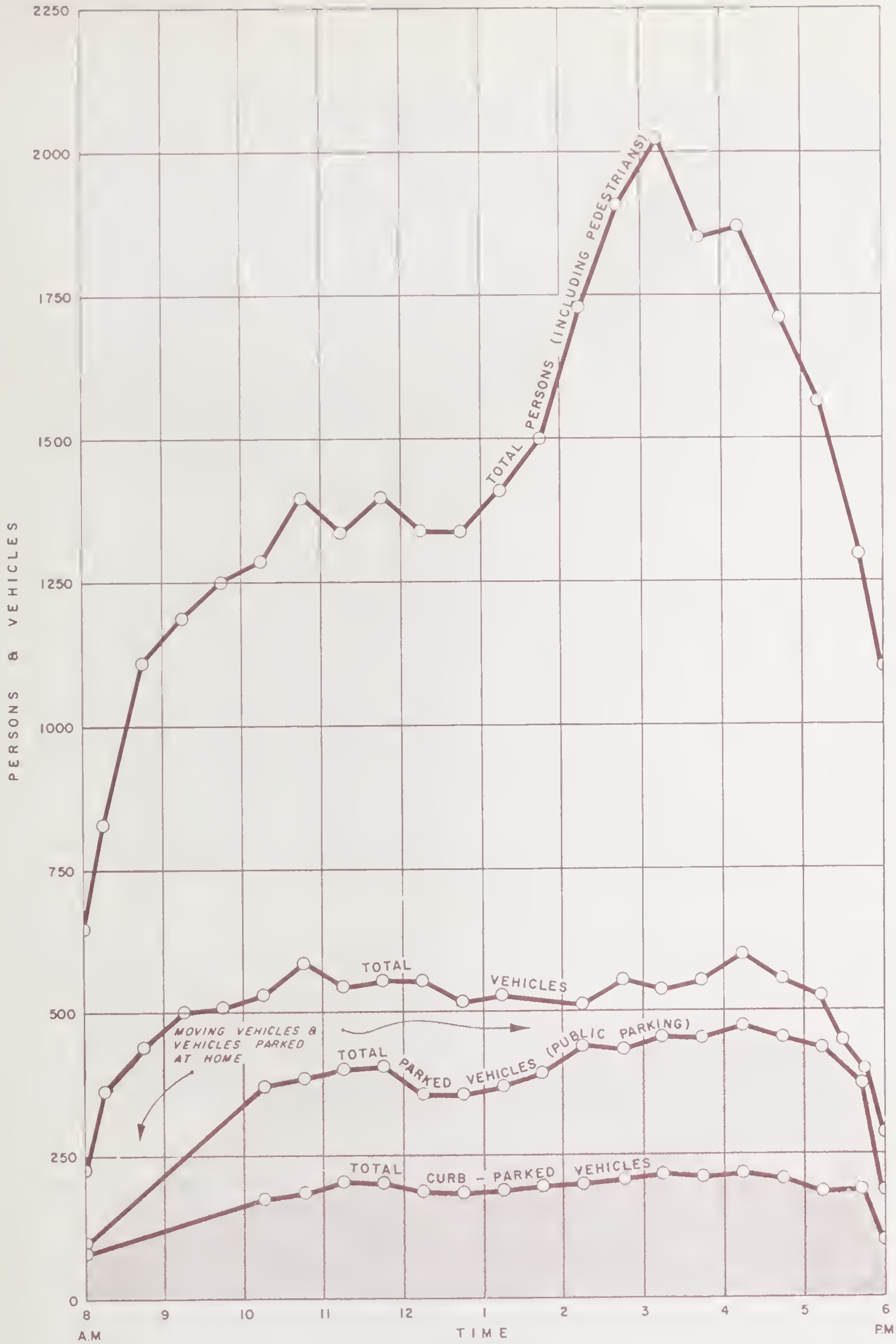
The hour between 3:30 and 4:30 p.m. appears to be the peak parking and shopping hour on a typical business day. During this hour, over 2,000 persons were within the CTD, and some 475 vehicles were parked in curb and off-street stalls. Both person- and vehicle-totals remained high during the peak travel hour, 4:30 to 5:30 p.m., when most work-to-home journeys were made away from, and in many cases through the central traffic district. Many homeward-bound plant and office workers normally stop to do incidental shopping within the downtown commercial area, thus contributing further to the large accumulations observed during the 2:30 to 5:30 p.m. period.

The foregoing discussion has particular relevance to the central traffic district parking study (subsection 2.3).

TRIP PURPOSES

Internal Trips - 7:00 a.m. to 8:00 p.m. - Average Weekday, 1964

PURPOSE	PERCENTAGE
Work (home to work and/or work to home)	42
General Business (attend meetings, pay bills, etc.)	17
Medical/Dental Appointment	2
School Attendance	Negligible
Social/Recreational Function	22
Change Travel Mode (connecting link between major trip segments)	Negligible
Shop (consumer goods purchase, obtain haircut, eat meal at restaurant, etc.)	15
Other	2
	100%



CENTRAL TRAFFIC DISTRICT ACCUMULATIONS

2.2.6.3 Centre Bridge Pedestrian Survey

This represents a "capsule comment", as it were, on the significance of walking into Wallaceburg's central business district. Since the Centre Bridge was closed to vehicular traffic, a most unusual and quite pleasant facility has been introduced in the form of a footbridge across the Sydenham River. Appendix L indicates survey findings, and the relative importance of this unique pedestrian-way in the context of overall CBD circulation. Nearly 3,000 persons used the crossing throughout the 13-hour survey period: this represents a substantial pedestrian movement, most of which was recorded between 10:00 a.m. and 6:00 p.m. Some 84% of those interviewed gave "shopping" or "business appointment" as trip purpose.

In order to establish a realistic perspective, it should be pointed out that less than 5% of the inbound pedestrians (i.e. those walking toward James Street) drove cars to the south side before walking across the Centre Bridge. Hence, it must be assumed that 95% of the inbound pedestrians either did not drive at all; or left their cars north of the Sydenham River, and after walking across the bridge to the south side, were later interviewed walking back. During the course of the survey, great care was exercised to discover who had driven and who had not driven; thus, survey results may be considered adequate for present purposes.

It was most interesting to learn that more than three-quarters of those who parked on the south side before walking across the bridge, indicated that they were commonly accustomed to drive into the James Street commercial area before the Centre Bridge was closed to traffic. Again, however, the relative smallness of the absolute number of interviewees must be emphasized.

Nevertheless, the survey does suggest that some 50 or 60 cars which used to enter the most congested area of the Town no longer do so. Despite the apparent insignificance of the figure, the changes in attitude and travel habit represented are significant. Moreover, as the Town develops, and as the CBD grows and becomes more concentrated, the relief afforded the downtown area will become ever more meaningful. Thus, the attractiveness and convenience of the Centre Bridge pedestrian route should be emphasized and enhanced at every opportunity.

Exhibit 2.E indicates average peak period travel times centred upon the heart of the CBD - the intersection of James and Nelson Streets. Both walking times and vehicle travel times are shown, and it is apparent that it takes as long to drive from this focal point to (for example) King and McDougall Streets, as it does to walk: moreover, vehicle trip durations shown do not include the unavoidable terminal time*. Hence, unless a car is expressly required, it becomes quite convenient - as far as trip duration alone is concerned - to park at a central location and walk to ultimate destinations within the CBD.

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* Time required for parking and unparking, and for walking between parking location and ultimate origin/destination.

2.3 CENTRAL TRAFFIC DISTRICT PARKING CHARACTERISTICS - 1964

2.3.1 PARKING SPACE INVENTORY

The central traffic district enclosed by the parking cordon includes five origin and destination zones, one of which - No. 120 - represents the core of Wallaceburg's commercial/retail area. Four of these zones are situated north of the Sydenham River. Zone 150, which contains several retail and service outlets, was developed commercially long ago, when the principal highway route (Highway No. 40) followed McDougall Street and the Centre Bridge.

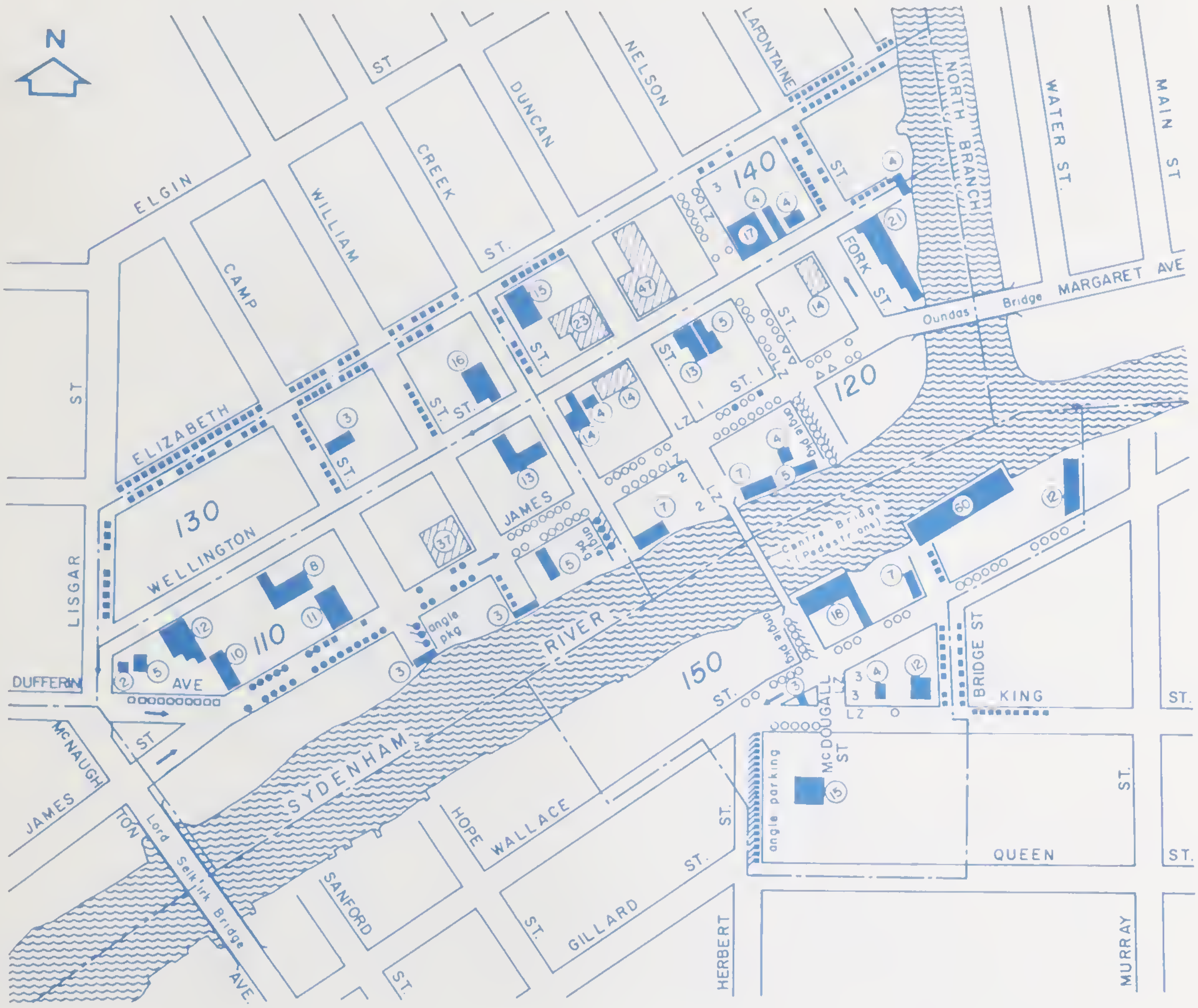
The area contained within the cordon appears excessively large with respect to the central business district itself, but it must be remembered that Zones 110, 130, 140 and 150 contain curb and off-street parking accommodation serving major downtown traffic generators. Furthermore, any parking study area (i.e. the CTD) must be sufficiently large to allow for potential CBD growth during the study period.

Exhibit 2.J illustrates the extent and variety of CTD parking accommodation, while Appendix M, Part I is a tabular summary of these data. The five-zone area provides space for 866 legally parked vehicles, in addition to 7 loading zones with a combined capacity of 15 trucks. This total is some 10% above the average for towns of comparable population.

The total CTD curb length - just over 21,000 lineal feet - includes some 7,800 lineal feet (37%) devoted to public curb parking and truck loading zones. Compared with the average for towns within its population group, Wallaceburg has approximately 18% more curb length within its CTD. This is no doubt due to the linear shape of the business area (i.e. commercial development concentrated along James Street), and to the shortness of many blocks. Furthermore, in the average town within this population group, curb parking of all types (i.e. public, truck loading and special permit) represents 67% of the total CTD curb footage - 1.8 times the 37% characteristic of Wallaceburg's CTD.

It is evident that:

(i) the narrowness of certain downtown streets renders them unsuitable as curb parking sites, and



LEGEND

METERED CURB

- △ 12 MINUTE LIMIT
- ○ ONE HOUR LIMIT
- ● TWO HOUR LIMIT

NON-METERED CURB

- ▪ UNLIMITED
- ▫ 1/2 HOUR LIMIT POSTED
- L Z TRUCK LOADING ZONE

LOTS

- PRIVATE
- MUNICIPAL METERED
- (8) DENOTES NUMBER OF SPACES
- O-D ZONE BOUNDARY
- 130 O-D ZONE NUMBER

NOTE

CASUAL NON-METERED OFF STREET PARKING (e.g. ONE OR TWO CARS PARKED IN AN ALLEY, OR CARS GARAGED BEHIND INDIVIDUAL STORES) IS NOT INDICATED HEREON IN THE INTEREST OF CLARITY

1964
PARKING ACCOMMODATION
CENTRAL TRAFFIC DISTRICT

(ii) the well-conceived, attractive and conveniently located municipal metered lots minimize the importance of, and indeed the necessity for, curb parking accommodation.

As indicated, curb parking represents 43%, and off-street facilities 57% of total parking supply: these values are characteristic not of small towns, but of the very largest cities of North America, many of which enjoy comprehensive off-street parking programs. This fact alone suggests the advanced nature of Wallaceburg's own off-street parking program.

In addition to the more obvious physical and operational limitations of downtown streets, requirements of safe and efficient circulation suggest how impractical it would be to increase the number of curb parking spaces. It may be concluded, therefore, that any deficiencies can and should be made up only by providing additional off-street spaces. Actually, projected increases in traffic volumes within the Wallaceburg urban area indicate that continued reduction in curb parking will be essential, in order to provide sufficient capacity for moving traffic.

Finally, a clear distinction should be made between municipal metered lots (operated for the use of the public in general) and private lots. Certain private lots are operated solely for the service and convenience of particular business owners and their staffs, and thus are not normally considered public facilities: however, other ostensibly private lots in fact do serve the public, when that public represents customers of various commercial/retail establishments. Such lots, therefore, satisfy a pressing need, and private enterprise should be encouraged to augment and improve them. Nevertheless, they cannot meet overall parking desires within the downtown area, and hence, a proper balance between privately and municipally operated facilities must be maintained.

2.3.2 SPACE USAGE

2.3.2.1 Adjustment of Survey Results

Results of the parking usage survey have been summarized in various ways to provide a basis both for analyzing the present situation, and for recommending an effective improvement program.

A review of parking habits indicates that the most intense space usage in commercial/retail areas occurs on Fridays* and Saturdays - the two most popular shopping days. Also, it is quite obvious that the level of parking demand is appreciably elevated at certain times of the year; e.g. during the Christmas season. Therefore, the usage characteristics observed during the course of the parking survey have been carefully adjusted to compensate for such daily and seasonal variations.

In applying these adjustments, consideration has been given to the types and intensities of commercial land use within each O-D zone, to the traffic (and hence, parking) generation potentials of various establishments and/or block faces, and to the levels of space usage turnover recorded. Depending upon the area, adjustments result in usage levels 10% to 15% higher than those actually observed. It is our opinion that the tabulations and summaries contained in Appendix M define the parking situation in downtown Wallaceburg, under conditions of maximum demand. It is only when parking space usage characteristics are analyzed within such a context, that a coherent improvement program can be devised.

2.3.2.2 10:00 a.m. to 6:00 p.m. Parking Space Usage

Appendix M, Part II indicates that of 2,835 vehicles parked within the CTD, 1,005 (35.5%) used metered curb spaces, while 594 (21.0%) either used non-metered curb spaces or parked at illegal curb locations. Hence, off-street facilities, which account for nearly 57% of the total CTD parking accommodation, were used by 43.5% of the vehicles observed during the survey. This is due to the relatively shorter time limits imposed at curb meters, which in turn lead to relatively high rates of space usage turnover: also, the longer time limits imposed by off-street meters are far more likely to attract the limited number of persons who require long-term parking.

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* The Wallaceburg CTD parking usage survey was carried out on Monday, Tuesday and Thursday, August 17, 18, and 20, 1964. Since most retail outlets close on Wednesday afternoons, Wednesdays were not considered to be typical business weekdays for survey purposes.

In addition to imposing time limits upon the use of curb space by means of meters, the setting up of cost differentials in favour of off-street facilities would certainly encourage their use. Indeed, the latter must remain the prime objective of any parking program, for it is evident that the occupation of road space by parked vehicles and the disruption of traffic flow caused by parking and unparking manoeuvres, effectively reduce roadway capacity.

Whereas Appendix M, Part II indicates the number of vehicles observed at various parking facilities, this is not a meaningful indicator of how intensively these facilities were being used (e.g. a meter might accommodate one vehicle per day, but it is extremely important to know whether that vehicle occupied the space for 30 minutes or for the full eight-hour survey period). Hence, Parts III and IV of Appendix M have been devised to show the number of vehicles parked per space (i.e. turnover), and space occupancy in terms of per cent usage of space hours.

As expected, the highest turnover (9.5) occurred at the four 12-minute meters situated in an area of intense short-term demand outside the Public Library and the Post Office. In general, turnover at 1-hour meters was observed to be high, while the level of usage (62%) was also among the highest recorded for any parking space category.

It should be mentioned that, while the usage of all off-street facilities exceeded 50%, the turnover - particularly in the case of private lots - was quite low. This indicates that a large proportion of the usage figure represented long-term and all-day parking. The discouragingly low usage levels recorded for municipal metered lots only serves to emphasize the fact that curb parking is still preferred by the majority of drivers. The prohibition of curb parking in the vicinities of such lots, and (as suggested earlier) the establishment of parking fee differentials favouring the lots, would allow these excellent facilities to perform their dual function of freeing the streets for moving traffic, and of providing well-designed, safe, conveniently located parking accommodation.

The highest rate of turnover occurred in Zone 120, which contains all of Wallaceburg's principal stores and service establishments, centred upon James Street. In addition, levels of space usage in this zone and

in Zones 130 and 140 (those adjacent to Zone 120) were seen to be relatively high. Due to the fact that considerable time is usually required to find accommodation and to manoeuvre into and out of parking spaces, 85% usage is normally considered the practical limit in concentrated commercial areas where rapid turnover is the rule. As indicated by Appendix M, Part III, this level was exceeded only in the case of curb parking in Zone 140; however, it is also apparent that turnover here is relatively low, denoting a very large number of long-term and all day parkers. In other words, such high usage is only attainable because parking accommodation in Zone 140 is used almost exclusively for long-term storage of vehicles.

It must be emphasized that, while the usage of curb spaces may be quite heavy (e.g. Zones 120 and 140), both usage and turnover must be considered for all spaces (curb and off-street) within a zone, when overall space deficiencies are being defined. It is seen that no CTD zone exhibited an overall usage level greater than 67% - some 27% below the 85% usage considered critical.

2.3.2.3 Peak Parking Hour Space Usage

Parts V and VI of Appendix M indicate parking space usage during the peak parking hour - observed to be 3:30 to 4:30 p.m. on an average business day. Although the figures indicate extremely high (curb space) usage in certain O-D zones, it is unlikely that such levels of usage in fact occurred: more likely, these values resulted from the use of half-hourly surveillance intervals. For example, although a space may have been occupied on each of the two inspection tours made during the peak parking hour, it is not altogether accurate to interpret this as 100% occupancy of that space for the whole hour.

Again, it will be noted that the highest usage level noted during the peak parking hour was 76% - again, substantially below the critical 85% level.

Nevertheless, it may be observed that these data indicate a quite heavy demand for curb parking within the core of the CTD, between 3:30 and 4:30 p.m. Actually, however, available capacity appeared to be taxed in only few locations.

2.3.3 PARKING HABITS

Parts VII and VIII of Appendix M indicate parking durations recorded during the course of the usage study. Of all vehicles checked, 54.8% were noted on only one surveillance tour, which means that such vehicles occupied spaces for periods shorter than one hour. As a convention, it is assumed that these remained parked for an average of 30 minutes.

As expected, Part VIII shows that the majority of short-term parkers were accommodated at metered locations. These persons, coming into the central business district to shop or to transact business, would normally be attracted to parking spaces quite close to their destinations.

Assuming that "long-term" parking refers to periods in excess of two hours, then 16.7% of all parkers fell into this category: obviously, such parkers required far more parking spaces than would be required by a similar group of short-term parkers. The tabulations show that most of the former were accommodated on private lots and at non-metered curb spaces located on the fringes of the central business district.

2.3.4 ILLEGAL CURB PARKING

Appendix M, Part VIII indicates that 68 (9%) of those vehicles parked at one-hour meters remained more than one hour, and that 7 (just over 3%) of those parked at two-hour curb meters remained more than two hours. Moreover, Part IX shows that 217 (30%) of the metered curb space hours used represented illegal parking*. This percentage is somewhat higher than average for towns in Wallaceburg's population group, and suggests that meter by-laws could be more strictly enforced without running the risk of unduly harassing the public. More stringent enforcement, particularly within the core of the downtown area, would result in greater

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* For the purpose of this analysis, illegal curb parking is assumed to embrace two categories:

(i) failing to pay the prescribed meter fee, or

(ii) parking for a period in excess of the posted time limit.

availability of parking space for the public in general, and incidentally, in increased meter revenues. Alternatively, it may be advisable to review the usage characteristics and general service potential of curb meters at regular intervals, to determine if changes in time limits might be advisable.

To emphasize this point, it may be useful to refer once more to Parts VIII and IX of Appendix M: of 1,005 vehicles parked at metered curb spaces between 10:00 a.m. and 6:00 p.m. on an average business day, only 75 (i.e. barely 7.5%) parked longer than the posted time limits. However, fully 30% of the total metered curb space hours used were used illegally, largely due to the failure of parkers to pay prescribed meter fees.

2.3.5 SUMMARY

The patterns of parking space usage observed within the framework of the Simplified Parking Study, indicate that adequate space is available during all periods of the day. Generally, the types and numbers of spaces offered are sufficient to meet the demands of persons working in or visiting the central traffic district of Wallaceburg.

The effective maximum capacity figure (85%) was never exceeded on a purely zonal basis, considering both curb and off-street space. Furthermore, any high usage levels recorded might well be attributable to the surveillance procedure, which was based upon half-hourly intervals.

As expected, the area subject to the most intense usage was that centred upon James Street, between Creek and Fork Streets, i.e. the core of the downtown area.

In order to determine the precise nature of parking requirements, a Comprehensive Parking Study, involving interviews of parkers (i.e. to determine walking distances to destinations, significance and position of major generators, etc.) would have to be undertaken. However, requirements for additional parking space and for changes in meter specifications have been made quite clearly apparent: since these cannot by any measure be considered critical, more detailed investigations are not warranted at this time.

SECTION 3 - DEFINING THE PROBLEM

CONTENTS | PAGE

EXHIBITS | Follows Page

REFER TO
APPENDIX

A	Internal and External Origin and Destination Survey Average Weekday - 1964
B	Projected Internal and External Trips Average Weekday - 1985
C	Land Use and Travel Projection
D	Grouping of Internal Origin and Destination Zones and External Origin and Destination Stations

3.1 TRAVEL DESIRES - 1964 and 1985

3.1.1 THE URBAN FRAMEWORK

Future travel patterns in an urban area can only be envisaged after reviewing projected population growth and changes in rates of motor vehicle ownership and use. Obviously, urban development is the key to emerging transportation needs, and it is essential to adopt a reasonable plan of proposed land use, which will indicate areas of potentially intense traffic generation.

The Official Plan of the Wallaceburg Planning Area* was used in the preparation of Exhibits 3.A and 3.B. These portray general 1964 land use and projected (1985) land use, respectively.

Discussions held with the Planning Consultant yielded tabulations of 1964 and projected 1985 residential population, commercial/retail floor space and industrial employment for each of the 30 origin and destination zones into which the study area was subdivided. Changes expected during the planning period are based upon these data, and upon anticipated increases in motor vehicle ownership and use. All such indicators - including projected demand at external O-D stations - were evaluated, and all base data were reviewed by the Ontario Department of Highways. Authorization to use these data in the analysis was readily obtained.

Appendix C: "LAND USE AND TRAVEL PROJECTION" contains all pertinent tabulations, reflecting 1964 and projected 1985 conditions. In addition, all technical procedures are fully detailed.

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The impression gained from comparing Exhibits 3.A and 3.B is that no major changes are contemplated. Projected 1985 land use generally represents an "infilling" of presently undeveloped areas, and an extension of the basic pattern.

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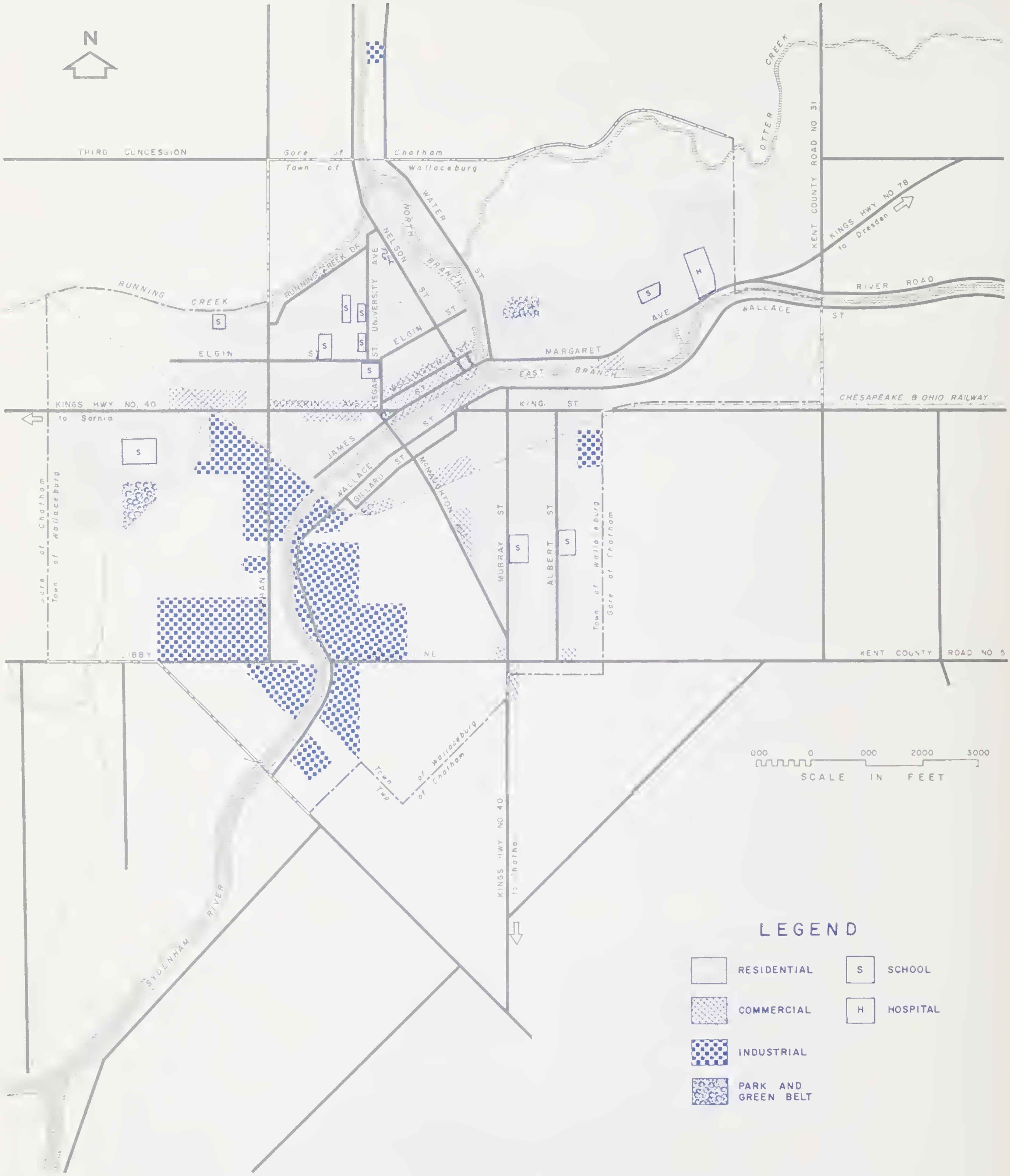
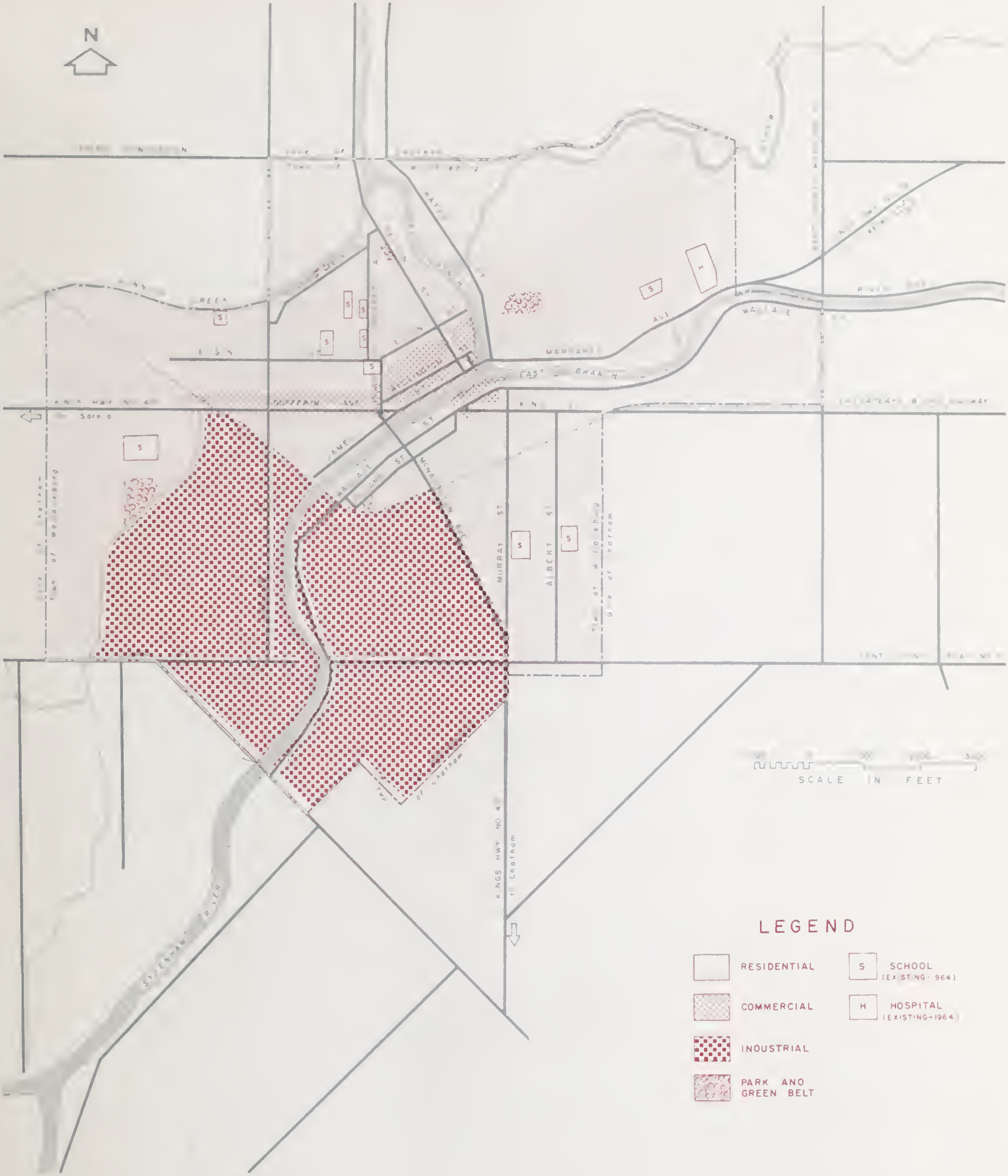
* The Official Plan, including Amendment No. 1, and various related exhibits concerned with existing and projected land use and population, was prepared by Mr. Alan Crossley, M.R.A.I.C., M.T.P.I.C., Planning Consultant to the Town of Wallaceburg.



1964 LAND USE



PROJECTED 1985 LAND USE

The central business district is expected to retain its position as the primary commercial/retail area of the Town and of the region, and may be enlarged slightly. It is also likely that the density of commercial development will increase.

A large volume of industrial development is expected over the next twenty years: indeed, two new plants and at least as many plant extensions have been started since this study was initiated, scarcely one year ago. As indicated by Exhibit 3.B, the industrial precinct is to be consolidated south-west of the Town on both sides of the Sydenham River. Certain "pockets" of industry - generally older operations - will become incompatible with their surroundings due to Wallaceburg's anticipated growth, and are likely to be eliminated.

Urban growth - and just as important, changes in the existing urban environment - beget a continuing need for services, including new and improved traffic facilities. A realistic appraisal of these needs can only be based upon a thorough understanding of concepts embodied in the Official Plan.

3.1.2 1964 TRAVEL DESIRES

The determination of trip origins and destinations is of prime importance in developing a coherent, comprehensive improvement program. As mentioned earlier, the Wallaceburg Traffic Planning Study grew out of a basic concern with the problem of river-crossings. Wallaceburg is truly interlaced with waterways, and while this undeniably creates a picturesque setting, it also gives rise to far-ranging problems involving poor access and route discontinuity - problems often quite difficult and expensive to resolve.

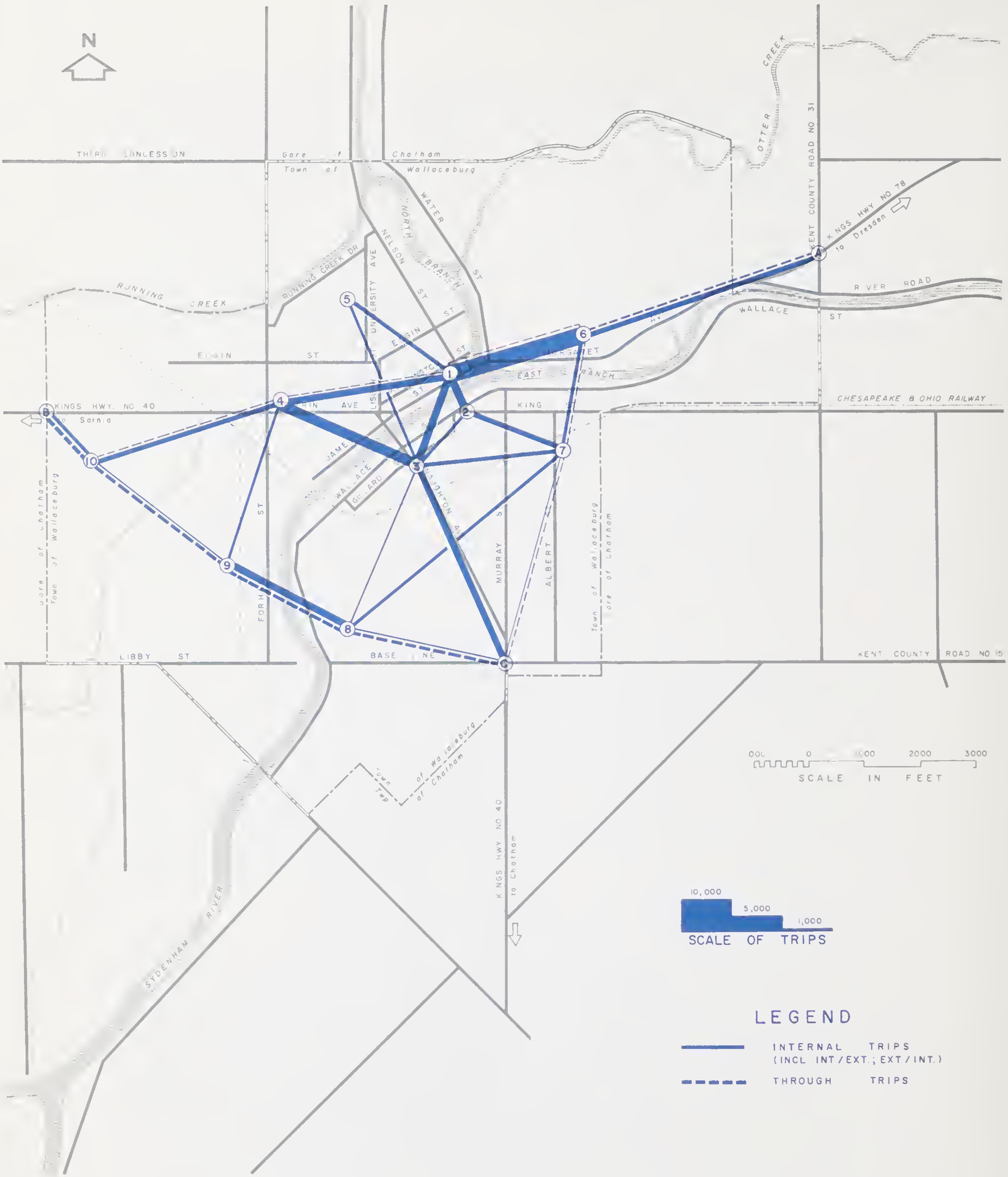
The Internal Origin and Destination Survey was designed to reflect TRANS-RIVER TRAVEL DESIRES. Driver-interview stations were established only on the Lord Selkirk and Dundas Bridges, and Exhibit 3.C indicates river-crossing desires for an average weekday in 1964. These desire lines are composite in nature; although the study area was subdivided into 30 origin and destination zones for analysis purposes, a very confused and virtually meaningless pattern would have emerged, had all possible interzonal and interstation desire lines been plotted. It was decided, therefore, to group adjacent O-D zones of similar land use (i.e. similar traffic generation characteristics); for example, Group 1 represents all

central traffic district O-D zones north of the river; Group 8 represents all industrial O-D zones south of the river. Grouping of external O-D stations is based upon primary direction; e.g. Group A represents the convergence of the two major routes entering Wallaceburg from the north-east. O-D zone and station grouping is dealt with in detail, in Appendix D.

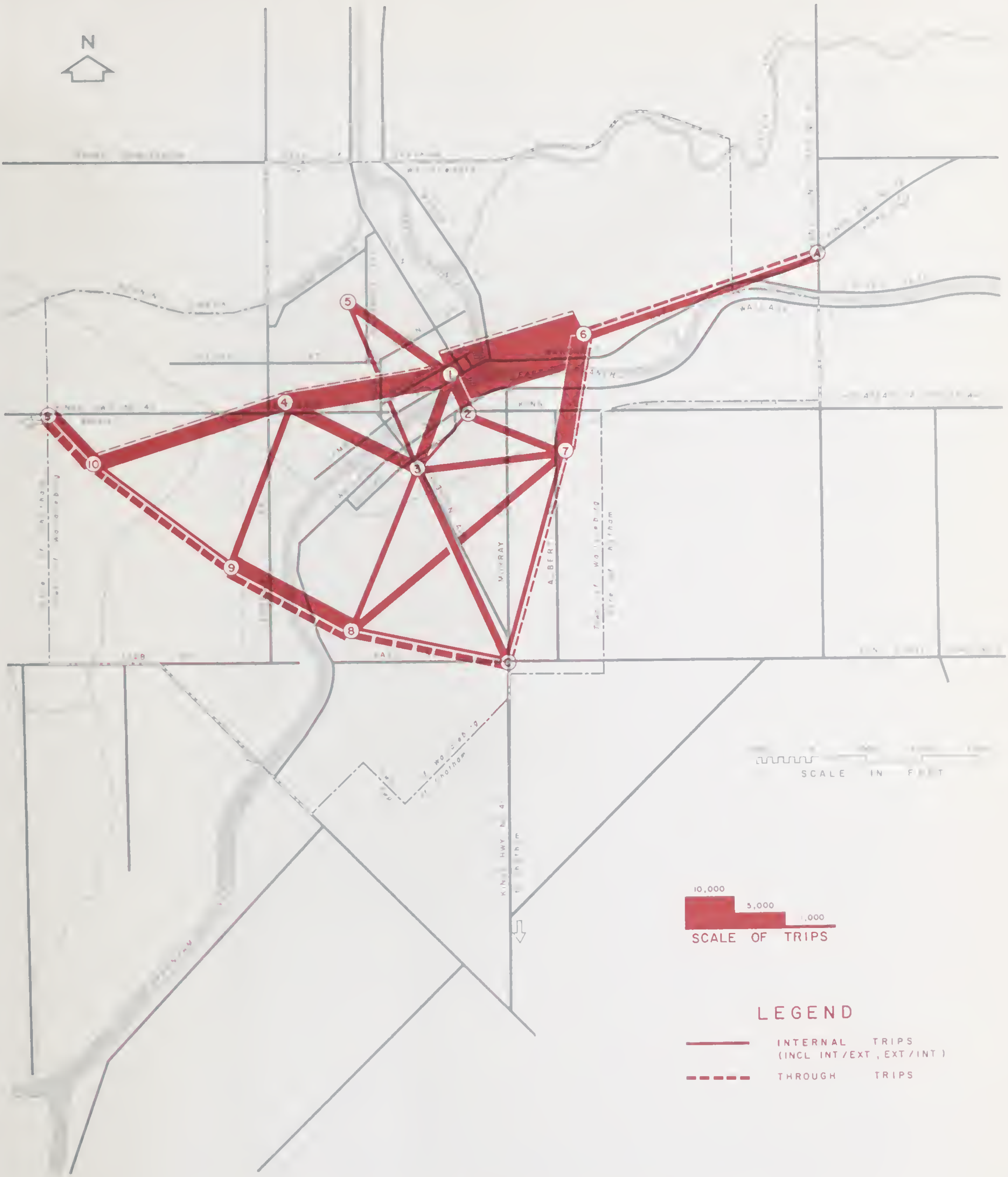
As Exhibits 3.C and 3.D suggest, major natural barriers also affected the constitution of zone groups, and in each case, a group's centre of influence (i.e. centroid) was chosen so that the composite desire lines would at least roughly correspond with familiar major travel "corridors". For example, the very broad east-west band closely follows the Margaret/Wellington/James/Dufferin arterial route, while other pronounced flows are seen to correspond with McNaughton Avenue and Wallace Street. Several heavy bands cross the Sydenham River at diverse points.

Under prevailing conditions, the Lord Selkirk Bridge provides the only vehicular connection between the north and south sides of the Sydenham River. Hence, the pattern of trans-river travel desires shown on Exhibit 3.C cannot be directly compared with the pattern of trans-river trips, since all of the latter must use the sole existing facility. For example, Appendix A, the trip table representing the internal and external origin and destination surveys, indicates that 1,062 trips took place between the north-east portion of the Town (bounded by the North and East branches of the Sydenham River) and the area south of the river. These trips - representing nearly 10 per cent of total average weekday internal (river-crossing) trips - could only be accommodated by the Lord Selkirk Bridge, and were thus channelled through the central business district, despite the fact that they were not "potential" to that congested area.

Some 1,840 through trips were recorded on an average weekday in 1964: this represented 16 per cent of the total number of trips entering, leaving and passing through the study area. By far the heaviest through movement occurred on Highway 40, while considerably lighter movements occurred between the north-east and the south, and between the north-west and the south. Exhibit 3.C also indicates the relative significance of internal and external traffic movements.



1964
TRANS-RIVER TRAVEL DESIRES



PROJECTED 1985
TRANS-RIVER TRAVEL DESIRES

3.1.3 1985 TRAVEL DESIRES

Experience indicates that 20 to 25 years represents the practical limit of a planning study period for an urban area. While updating and periodic review of recommendations will certainly be required, it is felt that land use and population studies are sufficiently well documented to serve as a reliable base for a 20-year improvement scheme. In addition, most authorities believe that, although the motor vehicle will have undergone certain evolutionary changes by 1985, it will retain the general operating characteristics familiar today.

The existing major street system will remain the transportation "backbone" of Wallaceburg. However, several improvements and additions will be required to enable the system to cope with increased travel demands. Comparisons between Exhibits 3.C and 3.D, and between Appendices A and B, serve well to underline the magnitude of anticipated increases in demand. Average weekday internal trips (again, not including non-river-crossing trips) are expected to more than double, while external trips (including through trips and internal/external-external/internal trips) will likely increase by three-quarters.

Exhibit 3.D indicates the sharp intensification of trans-river travel desires expected by 1985. The first impression is of a general system-wide increase, but further review will quickly make apparent the very marked increase in traffic to be generated by the north-east portion of the Town. According to the Official Plan, this area will experience a very substantial increase in population, relative to other neighbourhoods: indeed, it is here that several subdivisions are currently being developed, to take advantage of land availability, close proximity to the CBD and recent extension of municipal services.

It is evident that future river-crossing demands and - just as important - increased demands imposed upon the downtown street system, can only be satisfied by providing certain wholly new and greatly improved traffic facilities. However, the basic need remains the adoption of a comprehensive improvement program for the entire urban area. If prompt action is not taken to overcome current deficiencies, area growth coupled with increases in vehicle ownership and usage will compound many of today's problems.

3.2 1985 TRAFFIC ASSIGNMENT

3.2.1 GENERAL

Although desire lines are useful in illustrating travel patterns in general, they cannot specify detailed demands imposed upon individual traffic facilities. Hence, it is necessary to assign projected traffic flows to the major route network itself.

Traffic assignment is based upon distance and travel speed. The 30 O-D zones established for the study were combined on the joint basis of land use and relative position, into 17 groups*, whose centroids, together with the five major external O-D stations were positioned on the major route network.

Functional "level of service operating speeds" considered desirable for the various route classifications were then applied. These are listed in Exhibit 3.E.

This combination of data was then used to determine theoretical minimum travel times, via major routes, between each O-D zone group or external station centroid and all other centroids. This technique of trip path determination appears reasonable in the light of study findings in other urban areas; i.e. that choice of route ultimately depends more heavily upon total trip duration than upon total trip length.

After all "minimum time paths" were obtained, 1964 interzonal and interstation traffic movements were assigned to the existing major route network. Based upon results of the many ATR and intersection turning movement counts, adjustments were made to the assignment to allow for internal non-river crossing trips and for circulating trips not intercepted by the O-D survey. The latter are commonly overlooked when trip reports are conveyed to survey interviewers, but their total volume is substantial, representing some 10 to 15 per cent of traffic flow in heavily built-up areas.

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* Grouping of zones (and hence, of interzonal traffic movements) greatly simplified the assignment program, and resulted in virtually no loss of detail.

LEVEL OF SERVICE OPERATING SPEEDS

ROUTE CLASSIFICATION	AVERAGE OVERALL SPEED BY TYPE OF AREA (m.p.h.)		
	Urban	Suburban	Rural
Major Highway	-	40	60
Arterials with			
(a) Low Marginal Friction	30	40	50
(b) Normal Marginal Friction	25	35	45
(c) High Marginal Friction	20	30	-
Collectors	20	25	40
Business, (i.e. Commercial and Industrial) Streets			
(a) Outside Core Area	20	20	-
(b) Inside Core Area	15	-	-
Local Streets			
(a) Outside Core Area	15	15	-
(b) Inside Core Area	10	-	-

Circulating trips occur throughout the urban area, but are especially common in the central traffic district. They arise from several sources:

- the search for parking space,

- the "circling" of a block in order to reverse trip direction, (particularly applicable to downtown Wallaceburg's one-way street pattern),

- short detours made for the purpose of picking up or delivering persons or articles.

The first objective of this analysis is to adjust the 1964 assignment until it closely approximates the 1964 flow chart, illustrated by Exhibit 2.C; i.e. this chart depicts traffic flows actually recorded on the major route system of Wallaceburg on an average weekday in 1964. After modifying the 1964 assignment program, both 1964 and projected 1985 trips were assigned to the existing and proposed major route networks, so that volumetric (i.e. traffic demand) comparisons could be made. Internal, non-river crossing trips and circulating trips were expanded to represent 1985 conditions, and became additive to 1985 assigned volumes.

To sum up: the flow chart showing 1964 average weekday traffic volumes (Exhibit 2.C) may be considered a reliable basis for calibrating the traffic assignment program. Assignment techniques are explained more fully in Appendix C, Part VIII.

3.2.2 EXISTING MAJOR ROUTE SYSTEM

Exhibit 3.F portrays the average weekday traffic demands which would be imposed upon Wallaceburg's arterial and collector routes by 1985, if no major improvements or route extensions were to be undertaken. Even a cursory glance will make it obvious that the Town's major route system - in its present form - would be physically and operationally incapable of satisfying these demands.

The capacity* of the existing routes is also indicated on Exhibit 3.F assuming maximum practical street

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* The assumptions upon which route capacity calculations were based are included in Appendix C, Part X.

wideningswithin the limits imposed by roadway allowance and building setback. Thus, it was assumed that portions of Dufferin Avenue, McNaughton Avenue and Margaret Avenue operate as four lane, two-way roadways and that Wellington Street, James Street and Fork Street operate as three lane, one-way roadways. It is noted that even with these improvements in cross-section, traffic volumes exceed the route capacities.

Comparing Exhibit 3.F with the 1964 flow chart (Exhibit 2.C), it is noted that projected major route volumes would be generally twice those observed during 1964, and that volumes on certain route segments - notably Margaret Avenue, the one-way "couplet" serving the central traffic district, and (even more critical) the Dundas Bridge - would be three times those currently recorded.

It is apparent from Exhibit 3.F that the routes which presently carry the heaviest traffic volumes (i.e. King's Highways 40 and 78) would tend to become still further overloaded, due almost entirely to the location of the two existing Sydenham River crossings. Admittedly, the flow chart of Exhibit 3.F merely represents an academic exercise; i.e. it is abundantly clear that the streets of Wallaceburg could not possibly carry these volumes. Hence, a comprehensive program of physical and operational improvements must be undertaken during the next two decades, in order that the usefulness and efficiency of the Town's vital transportation facilities may be maintained and enhanced.

3.2.3 IMPROVED MAJOR ROUTE SYSTEM

3.2.3.1 General

The contrast between Exhibit 3.F and either Exhibit 3.G or 3.H is quite marked. Whereas 3.F portrays gross inbalance and totally infeasible overloadings of existing routes, 3.G and 3.H portray balanced practicable flows which could be accommodated by an improved and extended major route system - including additional Sydenham River crossings. The volume/capacity* ratio as illustrated on both Exhibits serves to identify the effect of improvements when compared to the unimproved system illustrated on Exhibit 3.F.

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* The assumptions upon which route capacity calculations were based are included in Appendix C, Part X.

1985 AVERAGE WEEKDAY TRAFFIC
ASSIGNED TO
EXISTING MAJOR ROUTE SYSTEM

The choice of bridge locations, and indeed, all functional aspects of the recommended 20-year plan, are described later: at this juncture, it is intended only to refer briefly tc salient features of the two 1985 assignments.

A review of Exhibits 3.G and 3.H indicates that the two existing vehicular bridges would not be called upon to carry volumes much greater than those carried today; indeed, if a new crossing of the East Branch were provided, volumes on the Lord Selkirk Bridge would be sharply reduced, and would likely remain below those currently recorded, even by 1985. Admittedly, a new East Branch crossing would attract certain trips generated west of the North Branch, and these would be forced onto the CBD one-way "couplet", the Dundas Bridge and Margaret Avenue. Conversely, the relief afforded these routes by the provision of a new East Branch crossing (i.e. a reduction in the amount of traffic passing through the CBD to gain access to the Lord Selkirk Bridge) would more than offset any increases in the opposite direction: furthermore, improvements recommended for the routes in question would enable them to handle the modestly increased circulating traffic likely to be engendered by the two - as it were - "competing" bridges.

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Even if a new crossing of the North Branch is built, the Dundas Bridge would become quite heavily loaded due to the substantial growth anticipated in the north-east portion of Wallaceburg. However, the two North Branch crossings, served by improved and extended access routes, could readily satisfy travel demands throughout the study period.

3.2.3.2 Interim Network - Libby Street/Base Line Bridge NOT INCLUDED:

As indicated by Exhibit 3.G, traffic flows on certain major east/west routes - notably Dufferin Avenue, James Street and Wellington Street - would become very heavy toward the end of the study period. Indeed, it is apparent that before 1985, Dufferin Avenue would have to be widened to six lanes between the Chesapeake and Ohio Railway crossing and McNaughton Avenue. Notwithstanding this improvement, congestion at the Dufferin/Lisgar/McNaughton inter-

1985 AVERAGE WEEKDAY TRAFFIC

ASSIGNED TO

IMPROVED MAJOR ROUTE SYSTEM "A"

INTERIM NETWORK

section would likely remain severe. Prospective route volumes and capacity deficiencies are portrayed by Exhibit 3.G. For the purpose of this illustration, it has been assumed that Dufferin Avenue would be widened to accommodate 4 lanes of moving traffic, and Wellington and James Streets, 3 lanes each.

Furthermore, without a connection between Libby Street and Base Line, routes such as Gillard Street and Base Line would remain somewhat "under-utilized": the Town's industrial area could not function as a unit, and consequently, its efficiency as a viable economic "sub-region" would be restricted. Heavy trucks and other traffic generated by the various plants would still be forced to use the Lord Selkirk Bridge, and to pass through the heart of Wallaceburg in order to cross the river.

While it is possible that the contemplated Highway 40 Relocation high-level bridge may satisfy certain of these demands, this facility would not be conveniently oriented for most local trips. In addition, due to the flatness of the countryside, approaches to such a structure would be extremely lengthy, and connections with local roadways would be widely separated and few in number (refer to Exhibit 4.A).

3.2.3.3 Recommended Network - Libby Street/Base Line Bridge INCLUDED:

Exhibit 3.H makes it apparent that considerable relief would be afforded routes such as Dufferin and McNaughton Avenues, if a Libby Street/Base Line connection is provided. The traffic relief afforded by this structure would be sufficient to reduce volumes on all routes to levels below capacities. Indeed, as illustrated by Exhibit 3.H, capacities of most routes are sufficiently great to accommodate further traffic increases beyond the year 1985.

In addition, the industrial area would be well and truly unified, and convenient transfers of personnel, equipment and materials among establishments on opposite sides of the Sydenham River would become possible. Functioning as a unit, well served by road, rail and water transport facilities, the full potential of Wallaceburg's industrial precinct could be realized. Moreover, the heavy trucks and other industrial traffic mentioned earlier would no longer be confined to the Lord Selkirk Bridge: hence, congestion at the

1985 AVERAGE WEEKDAY TRAFFIC

ASSIGNED TO

IMPROVED MAJOR ROUTE SYSTEM "B"

RECOMMENDED NETWORK

Dufferin/Lisgar/McNaughton intersection could be effectively curbed, and the streets of Wallaceburg relieved of many large, cumbersome vehicles.

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To sum up: although the Town's major route system could accommodate projected traffic demands without the Libby/Base Line connection, certain fairly extensive roadway improvements would be required: furthermore, roadway and intersection congestion - due largely to traffic generated by the two separated portions of the industrial area - would become increasingly severe in older sections of Wallaceburg. Therefore, the Libby Street/Base Line connection is included in the recommended 20-year improvement program. It is tentatively scheduled during the final five-year stage, when critical conditions on Dufferin Avenue, and at the Dufferin/Lisgar/McNaughton intersection are expected to arise.

Minor adjustments have been applied to a small number of assigned trip routings, in order to achieve system-wide balance between 1985 traffic demands and potential route capacities. The flow chart shown on Exhibit 3.H may thus be considered the basis of the recommended plan.

SECTION 4 - THE PLAN

CONTENTS PAGE

4.1 RECOMMENDATIONS

4.1.1 INTRODUCTION

In previous sections, references have been made to current roadway deficiencies and to increases in area travel demand which may be expected during the next twenty years. The various analyses and traffic assignments all indicate the need for a comprehensive, long-range plan for the Wallaceburg area, involving improvements and extensions to the major street system and at least two additional crossings of the Sydenham River's several channels.

Obviously, river crossings are and will continue to be key elements of the circulation system; indeed, overall travel patterns and nearly all major route alignments have been influenced to some degree by bridge location. Consequently, new bridge sites have been proposed with a view to creating an integrated system of major routes.

The major route system recommended for the Wallaceburg area is portrayed on Exhibit 4.A*. Most of the routes presently classified as arterial and collector routes are retained, although a considerable number of route extensions, improvements and replacements - as well as several wholly new routes - are proposed.

Basic aims of the recommended plan may be summarized as follows:

(a) to provide new bridges across the main channel, and across the North and East Branches of the Sydenham River,

(b) to improve major routes approaching and connecting all existing and proposed bridges,

(c) to provide relief for congested and poorly served areas by means of physical and operational improvements, and by creating alternative routes,

(d) to replace certain major routes having poor horizontal and vertical alignments or narrow roadway allowances, with new parallel facilities,

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* Stored in a pocket inside the rear cover of this report.

(e) to extend existing major routes and to establish wholly new routes, to serve developing districts,

(f) to create a comprehensive, integrated major route system interconnecting all existing and future neighbourhoods. As far as possible, the spacing of arterial and collector routes would conform with widely accepted standards, thus rendering all districts and major traffic generators (e.g. the CBD; the industrial precincts) conveniently accessible,

(g) to ameliorate severe congestion and the more hazardous traffic stream conflicts, thus promoting pedestrian and driver safety,

(h) to make the Sydenham District Hospital readily accessible from all directions.

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Certain individual projects are described in some detail in a later subsection, but it would seem worthwhile, at this point, to list the principal features of the plan.

(a) The Lord Selkirk Bridge would be relieved by providing a new crossing of the East Branch between Murray and Main Streets. Murray Street would become an important access route, and the Murray/McNaughton intersection would be improved.

(b) Downtown Wallaceburg would be largely relieved of traffic congestion by means of:

- geometric and operational improvement of the Dufferin/Lisgar/James/McNaughton complex.

- the realignment of the east end of Wellington Street to replace Fork Street,

- the provision of a new crossing of the North Branch at Elgin Street, and the establishment of Elgin Street (and its proposed extension east of the North Branch) as a major route bypassing the CBD, and affording relief to the Dundas Bridge,

- the improvement of certain north/south routes (i.e. Nelson Street; Creek Street) to serve as distributors of traffic to the CBD, Elgin Street and the north,

- the diversion of industrial traffic from the western portion of James Street onto Forhan Street and Dufferin Avenue, by means of restricting certain turns at the James/McNaughton intersection,

- the replacement of narrow, circuitous Wallace Street as the principal east/west route south of the Sydenham River, by an improved and extended Gillard/Queen route, from Base Line to Murray Street.

(c) Libby Street and Base Line would be connected by means of a new crossing of the Sydenham River. Thus, the Town's industrial area would be integrated, and a major new "southern route" would be created, connecting Forhan Street, Gillard Street and Highway 40. Murray Street and the new East Branch crossing would connect this route with the CBD and Margaret Avenue (Highway 78).

(d) Main Street and its northern extension would replace Water Street as the principal north/south route east of the North Branch. Water Street is extremely narrow, and closely skirts the waterway; indeed, the street would have to be closed at Miles Street in order to make way for the Elgin Street Bridge approach. In any event, Main Street would afford the proposed North Branch crossing and the entire north-eastern portion of Wallaceburg a direct connection with the proposed East Branch crossing, and could be extended northward, across (presently) undeveloped land.

(e) Various route widenings, intersection improvements and operational modifications would complement the more important features of the plan.

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To sum up: new bridges and improved routes would create a <u>major roadway loop</u> around downtown Wallaceburg: Elgin, Main, Murray, Queen and Gillard Streets could be used to bypass the more congested commercial areas, while streets such as Wallace and King would revert to the status of business area distributors. The James/Wellington one-way "couplet" serving the CBD would be improved, and would still perform its variegated role as a highway route, as a downtown distributor and as a shopping thoroughfare.

The new bridges - their locations, their functions and their implications for the future of Wallaceburg - are discussed at length in the following subsection. Suffice it to say here that current projections indicate the need for three new major crossings during the twenty-year study period. A high-level bridge southwest of the Town, serving a relocated Highway 40, is presently under consideration by the Province of Ontario. However, such a structure, with its lengthy approaches and eccentric orientation with respect to Wallaceburg would not satisfy local travel demands to any significant extent.

Finally, Exhibit 4.A indicates an extensive network of "possible future routes". These would be provided only as and when warranted by advancing urban development, both during and beyond the study period. In certain cases, such routes represent the extension and designation (as arterials or collectors) of existing local streets and township roads. Neither accurate scheduling nor precise alignments can be established at this time: the tentative network shown must be considered only as a <u>typical major route system</u>, intended to serve the areas in question as they become developed. Moreover, the network would be laid out to complement existing routes: major intersections would be widely spaced, and route continuity would be maintained in order to avoid overloading existing facilities. Ultimately, additional crossings of the North and East Branches of the Sydenham River may be justified, as indicated on Exhibit 4.A. At this juncture, it appears that such crossings - at Third Concession and at Kent County Road No. 31, respectively - would not be warranted until after the end of the current study period.

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Appendices F and G contain annotated tabulations concerning the major route system recommended for Wallaceburg. Appendix F sets forth general design standards and desirable major route characteristics, while Appendix G deals with all proposed major routes in detail. It may be worthwhile to point out that the recommended 20-year plan does not cover all improvements listed in Appendix G: that complete list merely indicates a desirable level of improvement for each route, to be attained as and when the route is rebuilt, and not necessarily warranted by traffic demands expected to arise during the 20-year study period.

4.1.2 SYDENHAM RIVER CROSSINGS

As suggested earlier, the river-crossing problem is of paramount significance in the analysis of traffic movement in Wallaceburg: indeed, this traffic planning study was initiated on the strength of an apparent need for at least one new bridge. Therefore, it is felt that considerations which led up to the river-crossing proposals tabled herein should be discussed at this juncture.

4.1.2.1 Main Channel and East Branch

Exhibits 3.C and 3.D indicate very heavy current and projected river-crossing demands in a nominally north/south direction. Although at least six heavy desire lines may be noted, it would be plainly impracticable to provide as many bridges: hence, optimum locations must be sought.

Moment analysis - described in detail in Appendix C, Part IX, indicated that theoretically the most desirable location for a SINGLE CROSSING, based upon 1964 and projected 1985 travel desires, virtually coincides with the actual location of the Lord Selkirk Bridge. If such decisions were based solely upon mathematical exercises, it would be quite simple to recommend a "twinning" of that structure, perhaps one block to the east; however, it is at this point that other more practical considerations must be reviewed.

Simply stated, the introduction of another major bridge within the CBD would overload the CBD street network. Elaborate roadway improvements involving widening, rerouting, massive property demolition and, almost certainly, the prohibition of most curb parking, would

be required on both sides of the river. For example - the most likely northern approach for such a structure would be Nelson Street: however, the Nelson/James area represents the heart of downtown Wallaceburg, and the heavy turning movements which would occur at James and Wellington Streets could not be handled by the intersections in their present form. Moreover, the bridge approach would occupy most of the area now devoted to the Library Park - a very pleasant and highly valued feature of the Town's commercial core.

As far as the southern approach to such a structure is concerned, an entirely new major roadway would have to be developed, passing diagonally through several built-up blocks between the south bank of the river and, say, Murray Street near the Chesapeake and Ohio Railway Crossing. The potentially great cost involved, not to mention the resulting neighbourhood disruption, may be readily imagined.

Comparable physical barriers would appear to make any crossing west of the Lord Selkirk Bridge very difficult and prohibitively costly.

Therefore, considering:

(a) the very substantial growth envisaged in the north-east portion of the Town,

(b) the limited traffic capacity of the Dufferin/Lisgar/McNaughton/James intersection complex <u>notwithstanding the improvements portrayed by Exhibit 4.C</u>,

(c) the frequent openings of the Lord Selkirk Bridge during the navigation season, and

(d) the need - visually apparent on Exhibits 3.C and 3.D - for tying together the two halves of the industrial area,

it is recommended that

(a) a bridge be provided across the East Branch of the Sydenham River, connecting Murray and Main Streets, and that later,

(b) a bridge be provided across the main channel connecting Libby Street and Base Line.

The latter would not be built until the effects upon local travel patterns of the proposed Highway 40 (Relocation) high level bridge have been ascertained. Exhibit 4.A indicates the site currently being considered for this route by the Ontario Department of Highways.

Before this study was initiated, another site for an East Branch crossing was suggested; i.e. a southward extension of Kent County Road No. 31, east of Wallaceburg. This road appeared to be ideally oriented for use as a truck route between Chatham and Sarnia, but results of the South-Western Ontario Regional Traffic Study indicated that such a route would not attract the more important north/south movements and therefore, could not be justified. Moreover, its position, beyond the prospective eastern extremity of 1985 urban development, suggests that few local travel demands would be satisfied.

Finally, some mention should be made of the Centre Bridge. Since the recent closure to vehicular traffic of this venerable structure, it has become an unique, attractive pedestrian precinct in the heart of Wallaceburg's central business district: it appears to be popular and quite well used, for between 7:00 a.m. and 8:00 p.m. on a typical Friday in August 1964, nearly 3,000 individual pedestrian crossings were recorded.

Although the proposed bridge connecting Murray and Main Streets would, at first, encourage more people to drive into the major portion of the CBD north of the Sydenham River, it is felt that the projected growth of the CBD itself, the prospective development of high-density housing near the south bank of the river*, and the proposed landscaped pedestrian promenades and terraces along both river banks would all contribute to the utility and popularity of the existing pedestrian bridge. While the structure appears serviceable at present, ever-increasing demand, aesthetic considerations and the Town's

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* Refer to "Wallaceburg Town Centre - Long Term Proposals" prepared for the Wallaceburg Planning Board by Alan Crossley, M.R.A.I.C., M.T.P.I.C., Architect and Planning Consultant - June 1964.

financial capabilities may dictate a more elegant replacement, designed expressly for pedestrian use. In any event, every effort should be made to retain this peaceful, pleasant and virtually hazard-free haven as an element of downtown Wallaceburg's pedestrian circulation network.

4.1.2.2 North Branch

As shown by Exhibits 3.C and 3.D and by Appendices A and B, average weekday crossings of the North Branch are expected to triple by the year 1985. This represents the most substantial volumetric increase for any corridor within the urban area. The situation is expecially critical, since all demand is concentrated at or near the site of the existing Dundas Bridge, whereas main channel and East Branch crossing demands appear quite well distributed along the waterway.

It is apparent that additional capacity cannot be provided at or near the Dundas Bridge, because of capacity limitations inherent in the downtown street network. Again, massive reconstruction of the order described earlier, would have to be undertaken throughout the CBD: quite possibly, this would result in the virtual dissolution of downtown Wallaceburg (by no means an unattractive commercial precinct), and would, of course, involve great expenditures.

Obviously, such measures are impracticable, and an alternative crossing site must be chosen. This matter has concerned not only the Consultant, but also the Town Engineer and the Town's Planning Consultant for some months. Several factors were considered before tabling final recommendations.

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Three possible locations for a second crossing of the North Branch were considered - Third Concession, Elizabeth Street/Park Street, and Elgin Street/Miles Street.

It is felt that any new crossing should not be too far removed from existing built-up areas on both sides of the waterway. Considering the many other locations on the fringes of Wallaceburg which are currently ready for development, it seems unlikely

that the entire area east of the North Branch and south of Third Concession could be developed within the next 8 or 10 years. However, even if this did occur, and a new major east/west route were provided east of the river, a crossing in the vicinity of Third Concession - so far removed from concentrations of population and commercial and industrial activities - would not attract substantial traffic flows, or provide significant relief to the Dundas Bridge.

It is true that such a route would be useful for east/west through traffic (i.e. it would function as a northern highway bypass for Highways 78 and 40) and would also connect the industrial areas and the north-east: however, analysis of the O-D survey and of growth trends indicates that such travel demands will remain relatively low during the 20-year study period. Moreover, very few drivers would care to accept the increased trip lengths and travel times incurred by proceeding so far north to cross the river. Therefore, it is felt that a crossing at Third Concession would satisfy very few local travel demands, and that most drivers would tend to use the Dundas Bridge, in spite of congestion and delay.

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At first glance, the suggested Elizabeth Street/Park Street connection seemed functionally sound and well located to serve local traffic. However, several disadvantages soon became evident. Elizabeth Street is a pleasant, local, residential byway, providing direct access to a church and to a primary school. Also, it is quite narrow, makes a jogged intersection with Lisgar Street, and terminates at Forhan Street. Longer trips would not be well served by a route of such limited length, and even if relatively short trips generated by the CBD and by the Dufferin/Forhan area are considered, it is evident that Elizabeth Street would have to be widened and otherwise improved throughout its length.

The eastern approach to the bridge would be Park Street. This again is a quiet, narrow, relatively short street, and would have to be virtually rebuilt in order to function as an important traffic route: almost certainly, such an undertaking would be quite detrimental to this old but rather pleasant neighbourhood.

It is true that Elizabeth/Park was the site of the temporary bailey bridge erected during the construction of the Dundas Bridge, and possibly, this is one of the reasons the Town has considered it as the potential site of a permanent bridge.

A related suggestion involved the use of James and Elizabeth Streets (and the two North Branch crossings) as a one-way "couplet", with Wellington Street reverting to two-way operation, as an intermediate distributor, serving the CBD. Again, at first glance, this suggestion appeared to have merit, but further study indicated that it would not be suitable for Wallaceburg:

(a) Considering the small size and the narrow, elongated shape of the CBD, the scale of the one-way "couplet" (i.e. the separation between the two legs) would be far too large. Increased trip lengths and travel times required to enter and leave the core area, especially from and to the east, would inevitably give rise to inconvenience.

(b) Widenings of all three streets (James, Wellington and Elizabeth), in addition to improvements of several north/south streets, would be required within a limited period of time, in order to achieve operational flexibility and adequate capacity.

(c) The one-way "couplet" would commence on the east side of the North Branch, in the midst of the pleasant residential area mentioned above. This would result in general neighbourhood disruption, some measure of hazard, and inconvenience due to (directional) travel restrictions on the one-way system.

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It would appear that the Elgin/Miles Street connection is best suited to be the second permanent crossing of the North Branch. The separation between Elgin Street and the Margaret/James/Wellington route corresponds closely to that recommended for major routes in an urban area. West of the North Branch, Elgin Street is a well-aligned route which traverses the entire built-up portion of the Town: moreover, as the need arises, it could be extended across pre-

sently undeveloped land, and connected with Dufferin Avenue by means of existing and extended north/south routes (refer to Exhibit 4.A).

A section of Elgin Street some 2,000 feet in length has recently been widened and improved: it is quite probable that this section - between Forhan and Lisgar Streets - will not have to be widened again during the 20-year study period.

East of the North Branch, it is apparent that Miles and Water Streets would have to be closed, in order to achieve a reasonable approach grade and a desirable horizontal alignment. Main Street - widened, extended and otherwise improved - would become the principal north/south arterial route in this area, and would become a convenient, direct connection between the proposed East Branch and North Branch crossings (refer to Exhibits 4.E and 4.H).

East of Main Street, a roadway allowance would be established across land which is presently undeveloped. It is not likely that the second North Branch crossing will be required for some 10 or 12 years; however, the right-of-way for the "Elgin Street Extension" should be reserved at an early date, before new housing subdivision plans are processed. It would be extremely unfortunate if the opportunity to develop a major east/west roadway were lost.

As indicated on Exhibit 4.A, Thomas Avenue would become part of the new major route. It had been hoped to recommend a more northerly alignment - perhaps along the rear lot line, so that frontage access could have been effectively curbed - but a new subdivision presently being developed north of Thomas Avenue renders this impracticable. Nevertheless, Thomas Avenue does provide access to the Sydenham District Hospital, and the fact that this vitally important establishment would then be served by two major traffic routes, is important in itself. Moreover, both routes would cross the North Branch, and both would be afforded convenient connections with the proposed East Branch crossing: thus, the hospital would become easily accessible from all directions, to the great advantage of every resident of Wallaceburg and district.

As shown on Exhibit 4.H, it is suggested that the easterly end of the new route be tied in with

Margaret Avenue and River Road. In effect, the Elgin Street Extension (including Thomas Avenue and its extension) should function as a major east/west collector route, serving local traffic almost exclusively: hence, both ends should be located near urban area limits.

The temptation to connect the new route directly with Highway No. 78 should be strongly resisted. Such a connection would lead to a diversion of highway traffic from Margaret Avenue onto what would be essentially a residential collector route. This could obscure the new route's principal function, and could lead to reduced levels of pedestrian and driver safety.

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It has been suggested that the several schools and churches served by Elgin Street represent drawbacks to its use as a major route. In rebuttal, it can only be said that schools and churches are quite commonly located on collector or arterial routes in municipalities both large and small. Obviously, such establishments are major traffic generators in themselves: they must be conveniently accessible to the public, and hence, properly served by the major route system.

Furthermore, it must be realized that simply designating a route as an "arterial" or as a "collector" does not, in fact, funnel excessive traffic volumes onto it. Improvement proposals and route network changes must always be considered relatively; i.e. even by the end of the 20-year planning period, it is not anticipated that Elgin Street will be carrying volumes as heavy as those carried on Dufferin Avenue today. Moreover, the drivers of heavy trucks would have little call to follow Elgin Street in order to enter or leave the urban area; indeed, such vehicles could be barred from the route by means of a suitable bylaw.

Finally, well located and effectively controlled <u>school crossings</u> would be compatible with the traffic volumes envisaged: in any event, that section of the route closest to the complex of schools is not expected to be as heavily travelled as that immediately north of the CBD (refer to Exhibits 3.G and 3.H).

4.1.2.3 Movable and Fixed Bridges

Both branches of the Sydenham River are navigable - at least for small craft - for several miles upstream from Wallaceburg. The Lord Selkirk Bridge is opened very frequently during the summer, mostly to allow high-masted cabin cruisers to reach various public and private marinas east of the Town.

Understandably enough, the dream of dramatic industrial expansion is very persistent, and as a result, movable bridges (usually bascule type) continue to be built wherever a road must cross the Sydenham River. A movable bridge has been completed recently at Tupperville, just a few miles east of Wallaceburg on the East Branch, and it is expected that the new crossing of the North Branch, to be built by the County at or near Fourth Concession, will also be movable.

It would be plainly impractical to recommend a fixed bridge for the proposed East Branch crossing (Murray/Main), if only because a movable bridge has just been installed upstream at Tupperville. Therefore, despite the very high cost involved, there appears to be no feasible alternative to a movable bridge at this location. Although both swing and vertical lift bridges would be less expensive, the cost estimates and Exhibit 4.E are based upon a bascule bridge, similar in appearance to the Dundas Bridge. The two structures would be close to one another, and visual compatibility must therefore be considered. Although a swing bridge would also appear quite suitable in this regard, it is felt that the imposition of the large centre bearing might impede navigation in this relatively narrow reach of the waterway.

Notwithstanding these general considerations, it is felt that the North Branch represents an entirely different situation. Manv years ago, small freighters used to ply the North Branch to and from industrial installations at the village of Becher, and many area residents still look to a resurgence of industry along this waterway. What with the massive current and prospective industrial development occurring along the St. Clair River, it appears highly unlikely that either large vessels, or any new forms of water transport involving large freight or passenger vehicles (e.g. "hovercraft") will ever appear on the North Branch.

It is therefore recommended that the Elgin/Miles crossing be in the form of a fixed bridge, affording 15 feet of clearance above high water level: this would be sufficient for nearly all pleasure craft using the Sydenham River system. If the Town decides ultimately that this, too, must be a movable structure, the estimated cost given in Exhibit 4.B (Item III.1) would increase by approximately one million dollars.

In conclusion, it is interesting to note that bridge-opening statistics received from Kent County indicate that the Dundas Bridge has never been opened on demand from a vessel, but only to make sure that the elaborate and costly mechanism was still operating!

Downstream from the Lord Selkirk Bridge, the quite regular passage ~~of~~ cargo vessels (in addition to the fact that all upstream bridges are movable) makes it apparent that the Libby Street/Base Line connection would have to be a movable bridge. Since this is an industrial area, and also, since this structure would not be readily visible from other river crossings in the Town, a less costly vertical lift bridge may be deemed acceptable.

Finally, it may be said that high-level bridges were considered - but only quite briefly. It quickly became apparent that such structures would not be practical for local traffic circulation in the Wallaceburg area. Due to the flatness of the topography, high-level bridge approaches would only reach ground level nearly one-third or one-half mile away from the actual river crossing: in addition, such massive structures are prohibitively costly, and property requirements would be very extensive.

The Ontario Department of Highways is contemplating a high-level bridge south-west of the Town, in connection with the Highway 40 Relocation: the area in question is largely undeveloped at present. The proposed bridge would carry mostly long-distance through traffic, and would not be convenient for local movements, due to its orientation and lengthy approaches. Exhibit 4.A suggests the enormous magnitude of the proposed structure, with respect to Wallaceburg and environs.

4.1.3 STAGING AND ESTIMATED COSTS

In order that improvements may be scheduled to keep pace with emerging demands, the recommended plan is presented in four, five-year stages.

Stage I (1965 to 1970 inclusive) contains a large number of projects, many of which may be considered "backlog" items. As expected, several particularly urgent problems are dealt with and have been afforded a large measure of detailed treatment. Indeed, four of the six drawings prepared to illustrate the more important aspects of the 20-year plan, portray Stage I proposals.

For all sections of the urban area, predicted growth in travel demand has been contrasted with existing major route system capacity. In most cases, "straight line interpolation" has been applied to projected 1964-1985 traffic expansion, allowing each proposal to meet emerging requirements according to the time and warrant scales established. Hence, a reasonable sequence has been set up which would theoretically provide adequate, system-wide traffic capacity throughout the planning period. Moreover, the system thus achieved by 1985 would be a suitable foundation for additional extensions and improvements, required to meet the continuing needs of a growing Wallaceburg.

Exhibit 4.B is an itemized summary of all projects recommended within the context of the Wallaceburg Traffic Planning Study. Although several of the individual projects are discussed in the following subsection, generally speaking it is hoped that this annotated list is sufficiently clear and comprehensive to render long explanations unnecessary.

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All cost estimates are based upon current average prices of materials and labour quoted by the Wallaceburg Town Engineer. Figures presented on Exhibit 4.B under "Construction and/or Equipment" include allowances for engineering costs, and for contingencies such as rising prices (based upon prevailing trends), poor soil conditions, unusual utilities relocation problems, etc. In certain cases - particularly for projects included within later stages - such allowances approach 20 per cent of the total costs estimated.

PLAN SUMMARY AND COST ESTIMATES
RECOMMENDED SEQUENCE OF PROJECTS

STAGE I · 1965/1970

DESCRIPTION OF PROJECT								ESTIMATED COSTS		
PROJECT NUMBER	ROUTE(S)	IMPROVEMENTS	SECTION	APPROX. LENGTH (ft.)	PAVEMENT WIDTH (ft.) EXISTING	PAVEMENT WIDTH (ft.) PROPOSED MINIMUM	REFER TO EXHIBIT NUMBER	CONSTRUCTION AND/OR EQUIPMENT $	PROPERTY $	TOTAL $
I.1	Dufferin/Lisgar/McNaughton/James/Wellington vicinity	- pavement widening - improved channelization - rephasing of traffic signal		-	-	-	4.C	35,000	22,000	57,000
I.2	James St.	- road closure	McNaughton to Dufferin	350	-	-	4.C	Included under I.1		
I.3	McNaughton Ave.	- pavement widening - intersection improvements - traffic signal at Gillard/McNaughton	Lord Selkirk Bridge to Gillard	500	28 - 30	28 - 48 (taper near Bridge)	4.D	29,000 (including traffic signal)	11,000	40,000
I.4	Dufferin/Lorne/Johnston intersection	- improved Johnston St. approach, involving channelization	-	-	-	-	4.C	10,000	4,000	14,000
I.5	Dufferin Ave.	- pavement widening - intersection improvements	Forhan to W. Town Limit	4,000	20	18	4.A	191,000	-	191,000
I.6	Elgin St. Extension (1)	New Route (establish right-of-way (66 ft. minimum width))	(a) Main/Miles intersection to W. end of Thomas Ave.	2,900	-	Refer to III.5	4.J & 4.R	Refer to III.5	12,000	12,000
			(b) E. end of Thomas Ave. to River Rd.	1,300	-	Refer to III.5		Refer to III.5	4,000	4,000
I.7	Gillard St. Extension	New Route	Base Line to Gillard (east of Pearl)	3,000	-	48(2)	4.A	188,000	(3)	188,000
I.8	Base Line	First Phase (Refer to IV.5), involving - paving - intersection improvements	McNaughton to Gillard Extension	3,000	20 (gravel)	34(4)	4.A	76,000	-	76,000
I.9	Gillard St.	- pavement widening - intersection improvements	Gillard (east of Pearl) to Gerbert	2,800	20	48	4.A & 4.D	71,000	-	71,000
I.10	Gillard/Queen/Herbert intersection	- improved Gillard St. approach, involving channelization	-	-	-	-	4.D	8,000	22,000	30,000
I.11	Murray St./Main St.; connection across Sydenham River (East Branch)	4-lane bascule bridge and approaches, involving - intersection improvements - traffic signal at Margaret/Main	Wallace to Margaret	500	-	48 (50 ft. curb to curb on bridge)	4.B	1,323,000 (including traffic signal) (bridge structure alone: $1,300,000)	39,000	1,362,000
I.12	Margaret Ave.	- pavement widening - intersection improvements	Dundas Bridge to Dundas St.	1,000	22	48	4.B & 4.G	67,000	-	67,000
I.13	Murray St.	- pavement widening - intersection improvements	Wallace to Queen	800	20	48	4.B & 1.G	31,000	-	31,000
I.14	McNaughton/Murray/Base Line vicinity	- pavement widening - intersection improvements, involving channelization - traffic signals at McNaughton/Murray and McNaughton/Base Line	-	-	-	-	4.F	144,000 (including traffic signals)	2,000	146,000
I.15	Queen St.	- pavement widening - intersection improvements - traffic signal at Murray/Queen	Harbert to Murray	800	30	38	4.A & 4.D	31,000 (including traffic signal)	-	31,000
I.16	Wallace/King/Harbert intersection	- partial closure of Harbert/King connection	-	-	-	-	4.D	8,000	-	8,000
							TOTAL ESTIMATED COSTS - STAGE I	2,212,000	116,000	2,328,000

STAGE II · 1971/1975

PROJECT NUMBER	ROUTE(S)	IMPROVEMENTS	SECTION	APPROX. LENGTH (ft.)	PAVEMENT WIDTH (ft.) EXISTING	PAVEMENT WIDTH (ft.) PROPOSED MINIMUM	REFER TO EXHIBIT NUMBER	CONSTRUCTION AND/OR EQUIPMENT $	PROPERTY $	TOTAL $
II.1	Wellington St.	- realignment of E. end involving - closure of York St. - traffic signals at Nelson/Wellington and Nelson/James	Dundas Bridge to Nelson	400	-	36	4.O	35,000 (including traffic signals)	125,000	160,000
II.2	Wellington St.	- pavement widening - intersection improvements	Nelson to Lisgar	1,500	24	36	4.A, 4.C & 4.O	42,000	-	42,000
II.3	James St. (5)	- pavement widening - intersection improvements	Dufferin to Dundas Bridge	1,600	32 - 35	36	4.A, 4.C & 4.O	21,000	-	21,000
II.4	Nelson St.	- pavement widening - intersection improvements - widening of bridge over Running Creek	Elizabeth to Third Concession	3,900	20 (gravel north of Running Creek)	42 (Elizabeth to Elgin) 32 (Elgin to Third Concession)	4.A	151,000 (bridge widening alone: $30,000)	-	151,000
II.5	Elgin St.	- pavement widening - intersection improvements	Nelson to Lisgar	1,200	22	42	4.A & 4.O	40,000	-	40,000
II.6	Elgin/Lisgar intersection	- improved approaches, involving channelization	-	-	-	-	4.O	13,000	12,900	25,000
II.7	Margaret Ave.	- pavement widening - intersection improvements	Dundas Street to River Road	3,700	22	48	4.A & 4.H	106,000	-	106,000
II.8	Forhan St. (6)	- pavement widening - intersection improvements	Libby to Third Concession	9,000	24 - 30 (gravel north of Running Creek)	48 (Libby to Elgin) 34 (Elgin to Third Concession)	4.8	385,000 (bridge widening alone: $40,000)	-	385,000

DESCRIPTION OF PROJECT				
PROJECT NUMBER	ROUTE(S)	IMPROVEMENTS	SECTION	APPROX. LENGTH (ft.)
II.9	Libby St.	First Phase (Refer to IV.6), involving - paving - pavement widening - intersection improvements	Forhan to W. Town Limit	4,400 (7)
II.10	Highway No. 40 Relocation - "Blue Water Parkway" (8)	New Route, involving high-level bridge over Sydenham River, south of Town	N.A.	N.A.
			TOTAL ESTIMATED COSTS -	

STAGE III · 1976/1980

PROJECT NUMBER	ROUTE(S)	IMPROVEMENTS	SECTION	APPROX. LENGTH (ft.)
III.1	Elgin St./Miles St. (Elgin St. Extension); connection across Sydenham River (North Branch)	2-lane fixed bridge (9) and approaches, involving - road closures - Emily St. - Miles St. - Water St. - intersection improvements	Emily to Main	900
III.2	Elgin St.	- pavement widening - intersection improvements	Nelson to Emily	500
III.3	Main St.	- pavement widening - intersection improvements - traffic signal at Elgin St. Extension/Main	Margaret to Elgin Extension (Miles St.)	1,200
III.4	Murray St.	- pavement widening - intersection improvements	Queen to McNaughton	3,700
III.5	Elgin St. Extension	New Route (construction along right-of-way established during Stage I. Refer to I.6)	(a) Main/Miles intersection to W. end of Thomas Ave.	2,900
			(b) E. end of Thomas Ave. to River Rd	1,300
III.6	Highway No. 78/River Road/Elgin St. Extension intersection	- realignment of River Road approach to face Elgin St Extension approach - pavement widening - channelization	-	-
III.7	Highway No. 78 (Margaret Ave.)	- pavement widening - intersection improvements	River Road to Kent County Road No. 31	1,800

PAVEMENT WIDTH (ft.) EXISTING	PAVEMENT WIDTH (ft.) PROPOSED MINIMUM	REFER TO EXHIBIT NUMBER	CONSTRUCTION AND/OR EQUIPMENT $	PROPERTY $	TOTAL $
-	34	4.4 & 4.H	365,000 (bridge structure alone: $180,000)	28,000	393,000
-	42	4.4	62,000	45,000	107,000
20 (gravel)	42	4.4	62,000	2,000	64,000
20 - 26	32	4.A	72,000	-	72,000
STAGE III			1,299,000	118,000	1,417,000
20	34	4.A	35,000	-	35,000
-	34	4.A	164,000	5,000	169,000
20 - 30	48	4.8 & 4.F	140,000	-	140,000
-	38(10) (curb to curb on bridge)	4.A	1,270,000 (bridge structure alone: $1,200,000)	-	1,270,000
22 - 34(4)	48(4)	4.4 & 4.F	203,000	-	203,000
34(4)	48(4)	4.A	159,000	-	159,000
STAGE IV			1,971,000	5,000	1,976,000
III & IV			$6,445,000	$376,000	$6,821,000

WALLACEBURG
TRAFFIC PLANNING STUDY

PLAN SUMMARY AND COST ESTIMATES
RECOMMENDED SEQUENCE OF PROJECTS

STAGE I • 1965/1970

PROJECT NUMBER	ROUTE(S)	IMPROVEMENTS	SECTION
1.1	Dufferin Lisgar McNaughton James Wellington intersection	- pavement widening - improved channelization - replacing of traffic signal	-
1.2	James St.	- road closure	McNaughton to Dufferin
1.3	McNaughton Ave.	- pavement widening - intersection improvements - traffic signal at Gillard/McNaughton	Lord Selkirk Bridge to Gillard
1.4	Dufferin/Lorne Johnston intersection	- improved Johnston St. approach, involving channelization	-
1.5	Dufferin Ave.	- pavement widening - intersection improvements	Forhan to W. Town Limit
1.6	Elgin St. Extension (1)	New Route (establish right-of-way 66 ft. minimum width)	(a) Main/Miles intersection to W. end of Thomas Ave. (b) E. end of Thomas Ave. to River Rd.
1.7	Gillard St. Extension	New Route	Base Line to Gillard (east of Pearl)
1.8	Base Line	First Phase (Refer to IV.5), involving - paving - intersection improvements	McNaughton to Gillard Extension
1.9	Gillard St.	- pavement widening - intersection improvements	Gillard (east of Pearl) to Herbert
1.10	Gillard/Queen/Herbert intersection	- improved Gillard St. approach, involving channelization	-
1.11	Murray St./Main St.; connection across Sydenham River (East Branch)	4-lane bascule bridge and approaches, involving - intersection improvements - traffic signal at Margaret/Main	Wallace to Margaret
1.12	Margaret Ave.	- pavement widening - intersection improvements	Dundas Bridge to Dundas St.
1.13	Murray St.	- pavement widening - intersection improvements	Wallace to Queen

PAVEMENT WIDTH (ft.) EXISTING	PROPOSED MINIMUM	REFER TO EXHIBIT NUMBER	CONSTRUCTION AND/OR EQUIPMENT $	PROPERTY $	TOTAL $
-	-	4,F	144,000 (including traffic signals)	2,000	146,000
30	48	4,A & 4,D	31,000 (including traffic signal)	-	31,000
-	-	4,D	8,000	-	8,000
STAGE I			2,212,000	116,000	2,328,000

PAVEMENT WIDTH (ft.) EXISTING	PROPOSED MINIMUM	REFER TO EXHIBIT NUMBER	CONSTRUCTION AND/OR EQUIPMENT $	PROPERTY $	TOTAL $
	36	4,0	35,000 (including traffic signals)	125,000	160,000
24	36	4,A, 4,C & 4,0	42,000	-	42,000
32 - 35	36	4,A, 4,C & 4,0	21,000	-	21,000
20 (gravel north of Running Creek)	48 (Elizabeth to Elgin) 32 (Elgin to Third Concession)	4,8	151,000 (bridge widening alone: $30,000)	-	151,000
22	42	4,A & 4,0	40,000	-	40,000
		4,0	13,000	12,000	25,000
22	48	4,A & 4,B	106,000	-	106,000
18 - 30 (gravel north of Running Creek)	38 (Libby to Elgin) 38 (Elgin to Third Concession)	4,4	385,000 (bridge widening alone $40,000)	-	385,000

DESCRIPTION OF PROJECT								ESTIMATED COSTS		
PROJECT NUMBER	ROUTE(S)	IMPROVEMENTS	SECTION	APPROX. LENGTH (ft.)	PAVEMENT WIDTH (ft.) EXISTING	PROPOSED MINIMUM	REFER TO EXHIBIT NUMBER	CONSTRUCTION AND/OR EQUIPMENT $	PROPERTY $	TOTAL $
II.9	Libby St.	First Phase (Refer to IV.6), involving - paving - pavement widening - intersection improvements	Forhan to W. Town Limit	4,400 (7)	20 (paved for 650 ft. W. of Forhan; remainder gravel)	$34^{(4)}$	4,A	170,000	-	170,000
II.10	Highway No. 40 Relocation - "Wise Weler Parkway" (8)	New Route, involving high-level bridge over Sydenham River, south of Town	N.A.	N.A.	-	24 (rural highway standards)	4,A	-	-	-
TOTAL ESTIMATED COSTS - STAGE II								963,000	137,000	1,100,000

STAGE III • 1976/1980

PROJECT NUMBER	ROUTE(S)	IMPROVEMENTS	SECTION	APPROX. LENGTH (ft.)	PAVEMENT WIDTH (ft.) EXISTING	PROPOSED MINIMUM	REFER TO EXHIBIT NUMBER	CONSTRUCTION AND/OR EQUIPMENT $	PROPERTY $	TOTAL $
III.1	Elgin St./Miles St. (Elgin St. Extension); connection across Sydenham River (North Branch)	2-lane fixed bridge (9) and approaches, involving - road closures - Emily St. - Miles St. - Water St. - intersection improvements	Emily to Main	900	-	$38^{(10)}$ (curb to curb on bridge)	4,B	295,000 (bridge structure alone: $270,000)	43,000	338,000
III.2	Elgin St.	- pavement widening - intersection improvements	Nelson to Emily	500	20	42	4,A & 4,B	24,000	-	24,000
III.3	Main St.	- pavement widening - intersection improvements - traffic signal at Elgin St. Extension/Main	Margaret to Elgin Extension (Miles St.)	1,800	24	48	4,A & 4,H	43,000 (including traffic signal)	-	43,000
III.4	Murray St.	- pavement widening - intersection improvements	Queen to McNaughton	3,700	20 - 28	48	4,A & 4,F	92,000	-	92,000
III.5	Elgin St. Extension	New Route (construction along right-of-way established during Stage 1. Refer to I.6)	(a) Main/Miles intersection to W. end of Thomas Ave.	2,900	-	42 (Main/Miles to Dundas) 32 (Dundas to W. end of Thomas Ave.)	4,A & 4,H	174,000	Refer to I.6	174,000
			(b) E. end of Thomas Ave. to River Rd.	1,300	-	32		68,000	Refer to I.6	68,000
III.6	Highway No. 78/River Road/Elgin St. Extension intersection	- realignment of River Road approach to face Elgin St Extension approach - pavement widening - channelization	-	-	-	-	4,B	12,000	-	12,000
III.7	Highway No. 78 (Margaret Ave.)	- pavement widening - intersection improvements	River Road to Kent County Road No. 31	1,200	22	34	4,A & 4,H	30,000	-	30,000

DESCRIPTION OF PROJECT								ESTIMATED COSTS		
PROJECT NUMBER	ROUTE(S)	IMPROVEMENTS	SECTION	APPROX. LENGTH (ft.)	PAVEMENT WIDTH (ft.) EXISTING	PROPOSED MINIMUM	REFER TO EXHIBIT NUMBER	CONSTRUCTION AND/OR EQUIPMENT $	PROPERTY $	TOTAL $
III.8	Main St.	New Route, involving - bridge over Otter Creek - closure of Water St. (North Branch River Rd.) near Third Concession - short extensions of certain local streets	Elgin Extension to North Branch River Rd. approx. 1,000 ft. N. of Third Concession	4,000	-	34	4,A & 4,H	365,000 (bridge structure alone: $140,000)	28,000	393,000
III.9	Elm Drive Extension	New Route	Dufferin to Elgin	900	-	42	4,A	62,000	45,000	107,000
III.10	Elgin St.	- pavement widening - intersection improvements - short extension	Forhan to Elm	2,000	20 (gravel)	42	4,A	62,000	2,000	64,000
III.11	Creek St. and Brander Ave.	- pavement widening - intersection improvements	James/Creek to University/Brander	2,400	20 - 26	32	4,A	72,000	-	72,000
TOTAL ESTIMATED COSTS - STAGE III								1,299,000	118,000	1,417,000

STAGE IV • 1981/1985

PROJECT NUMBER	ROUTE(S)	IMPROVEMENTS	SECTION	APPROX. LENGTH (ft.)	PAVEMENT WIDTH (ft.) EXISTING	PROPOSED MINIMUM	REFER TO EXHIBIT NUMBER	CONSTRUCTION AND/OR EQUIPMENT $	PROPERTY $	TOTAL $
IV.1	Queen St.	- pavement widening - intersection improvements	Murray to C. & O. Railway	1,200	20	34	4,A	35,000	-	35,000
IV.2	Queen St. Extension	New Route, involving minor realignment of King St.	C. & O. Railway (at Queen St.) to Wallace St., approx. 2,400 ft. S. of Albert St.	8,000	-	34	4,A	164,000	5,000	169,000
IV.3	McNaughton Ave.	- pavement widening - intersection improvements	Gillard to Murray	3,200	20 - 30	48	4,A & 4,F	140,000	-	140,000
IV.4	Base Line/Libby St.; connection across Sydenham River	2-lane bascule bridge and approaches, involving - closure of Wallace St. - intersection improvements	Gillard Extension to Forhan	1,700	-	$38^{(10)}$ (curb to curb on bridge)	4,A	1,270,000 (bridge structure alone: $1,200,000)	-	1,270,000
IV.5	Base Line	Second Phase (Refer to I.8), involving pavement widening	E. Town Limit to Gillard Extension	4,500 (7)	$22 - 34^{(4)}$	$48^{(4)}$	4,A & 4,F	203,000	-	203,000
IV.6	Libby St.	Second Phase (Refer to II.9), involving pavement widening	Forhan to W. Town Limit	4,400 (7)	$34^{(4)}$	$48^{(4)}$	4,A	159,000	-	159,000
TOTAL ESTIMATED COSTS - STAGE IV								1,971,000	5,000	1,976,000
GRAND TOTALS • STAGES I, II, III & IV								$6,445,000	$376,000	$6,821,000

EXHIBIT 4.B

NOTES:

(1) Route consists of Miles Street (realigned as east approach to proposed North Branch bridge), Thomas Avenue and some 4,100 lineal feet of new construction. It is suggested that the entire route be named "Elgin Street", in order to avoid confusion.

(2) Pavement width of 48 feet may not be justified for the entire route immediately. Although cost estimates given here represent the project in its proposed ultimate form, the Corporation may decide to develop a 34- or 36 ft. pavement first, and delay the widening until warranted by increased demands.

(3) The Corporation is currently negotiating an easement with the present landowner. No direct expenditure for property is contemplated.

(4) Represents initial development, prior to building of Base Line/Libby Street connection across Sydenham River (refer to Item IV.4). Side ditch drainage would be suitable for this "First Phase".

(5) Three traffic lanes would be required within 10 to 15 years. Specified pavement widening is quite minimal, and could be carried out as part of the Corporation's sidewalk maintenance and pavement resurfacing program. However, long before any actual reconstruction is undertaken, dramatically increased traffic capacity could be achieved by prohibiting all curb parking.

(6) If Forhan Street is closed to traffic south of the Chesapeake and Ohio Railway crossing (i.e. because of plant expansion by Dominion Glass Company Ltd.), it is recommended that Elm Drive replace Forhan Street as the major north-south arterial route serving this section of Wallaceburg.

At this juncture, it is not possible to speculate on the future of Forhan Street vis-a-vis Elm Drive: however, since the former already exists as an important route, it is logical to assume that it will continue to function thus. Hence, the 20-year program includes the improvement of Forhan Street to meet arterial route standards, whereas Elm Drive is considered a collector route, to be developed only as and when required.

(7) As industrial development proceeds in this area, Libby Street should be improved as far as the first township road west of the Wallaceburg Town Limits. As traffic demands increase, it would likely prove desirable to extend the latter northward, first to Dufferin Avenue, then to Third Concession (refer to Exhibit 4.A).

(8) The alignment indicated on Exhibit 4.A has been plotted in accordance with the most recent data obtained from the planning arm of the Ontario Department of Highways (South-western Region). It is contemplated that this section of the Highway No. 40 Relocation /"Blue Water Parkway" will be built within the next 5 to 10 years.

All expenditure involved in this project would be borne by the Province of Ontario.

(9) Prevailing and prospective navigation demands indicate that the high cost of a movable bridge can scarcely be justified at this location. Nevertheless, conditions and requirements could change with the passage of time, and a movable bridge may indeed be warranted in the future.

(10) According to current traffic projections (refer to Exhibits 3.G and 3.H), two traffic lanes would afford adequate capacity. However, the provision of a roadway 38 feet in width (only 6 feet in excess of that commonly stipulated for a two-lane bridge) would allow three lanes of desirable width to be delineated. With this arrangement, reversible centre lane (i.e. "unbalanced") operation could be established in the future, to suit hourly/daily variations in traffic demand.

Property values were obtained from the Town's Assessment Department, and are based upon recent purchase prices: hence, these figures may be assumed to reflect local real estate market conditions.

Admittedly, total estimated costs for each stage appear high, considering the present size of the Town. However, several factors must be considered in reviewing the estimates.

(a) Cost estimates cover four, five-year periods: the total to be contributed by the Town, after all subsidies have been received, would average less than $120,000 annually.

(b) At least 65 per cent of the total would represent subsidies payable by the Province of Ontario and by the County of Kent.

(c) The population of Wallaceburg is confidently expected to reach 18,000 by 1985; i.e. the plan has been developed with this magnitude of growth in view. In addition, increased commercial and industrial activity will likely establish levels of prosperity substantially higher than those suggested by projected population growth alone.

Thus, the cost - spread over twenty years - should not be thought of in terms of the Wallaceburg of 1964: rather, the average of the 1964 and projected 1985 populations should be borne in mind when reviewing costs. Taking the average population during the planning period as 15,000, the average cost per capita would amount to $8 annually - all provincial and county subsidies having been paid.

(d) River crossings - key elements of the plan, and crucial factors to consider in analyzing the basic way of life in Wallaceburg - are expensive, large-scale projects. Bascule bridges normally cost two to three times as much as fixed bridges in comparable positions, and the Town is virtually obligated to install movable structures at any point along the main channel and the East Branch of the Sydenham River. Fortunately, however, subsidies are available from higher levels of government.

(e) The plan is developed as a long-range, comprehensive scheme, designed to satisfy all foreseeable needs. Individual projects are described - and costed - in terms of recommended ultimate development, in all cases. For example, the estimated cost of the widening and extension of Gillard Street is based upon a roadway 48 feet in width, built to urban standards (i.e. including full storm sewerage, curb and gutter, lighting, sidewalk, etc.). It is entirely possible, however, that the project could be developed in stages, the first to consist of a far less expensive partial widening, and a route extension with a pavement (say) 34 or 36 feet wide.

****

The distribution of costs presented below may be considered an extension of Exhibit 4.B. Subsidies payable are based upon the current Ontario Department of Highways policy with respect to Towns with populations exceeding 2,500; i.e.

	Subsidies Payable*		
Item	Roadwork	Structures	Property
King's Highway Connecting Links**	90%	90%	50%
Municipal Roads	50%	80%	50%

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* Items such as sidewalks and roadway lighting are not normally eligible for subsidy. Percentages have been applied on this basis, and hence, the last two columns of the Cost Distribution table represent a realistic appraisal of costs to be borne by the Town.

** Only the existing system of King's Highway Connecting Links has been considered, in calculating subsidies payable. Prospective extensions of or deletions from the system are not dealt with in the body of this report, and must be the subject of negotiations between the Town and the Department of Highways.

COST DISTRIBUTION

STAGE	Total Estimated Cost	Estimated Subsidies Payable	Estimated Cost to the Town of Wallaceburg: Stage Total	Estimated Cost to the Town of Wallaceburg: Approximate Annual Average
I	$2,328,000	$1,687,000	$ 641,000	$128,000
II	1,100,000	600,000	500,000	100,000
III	1,417,000	802,000	615,000	123,000
IV	1,976,000	1,360,000	616,000	123,000
20-year plan	$6,821,000	$4,449,000	$2,372,000	$118,000

Finally, it should be mentioned that estimated property costs generally do not include allowances for the widening of existing roadway allowances to conform with the criteria set forth in Appendix F. It is recognized that such costs could be considerable, and it is assumed that additional right-of-way will be purchased in critical locations as and when funds become available. This will, no doubt, be a long-term, painstaking, intermittent process: a worthwhile first step would be the establishment of setback regulations, covering new and rebuilt structures.

4.1.4 FUNCTIONAL ASPECTS

It is believed that Exhibits 4.A and 4.B, and Appendices F and G represent a clear, detailed summary of all recommended projects. Hence, additional comments are required dealing only with the more complex or significant proposals.

4.1.4.1 Stage I: 1965 - 1970

Item I.1* - Dufferin/Lisgar/McNaughton/James/Wellington vicinity:

Item I.2 - James Street (road closure):

The geometric improvements and traffic signal modifications shown on Exhibit 4.C would greatly increase the capacity of this vital junction. The complex will remain important not only because of the Lord Selkirk Bridge, but also since it represents the west end of the James/Wellington one-way "couplet" serving the CBD; i.e. it is heavily used by all segments of traffic flow - long-distance, local and circulating.

Furthermore, this area will always be subject to lengthy back-ups and "surges" of traffic, due to the frequent openings of the Lord Selkirk Bridge during the navigation season; hence, every effort should be made to increase vehicle storage space and capacity in general, by providing main approaches of generous width, and long, gently curved, separate turning lanes.

The closure of James Street between McNaughton and Dufferin Avenues, and the banning of all left turns at the James/McNaughton intersection (note island) would divert many large trucks and other industrial traffic from James Street onto Forhan Street and Dufferin Avenue - both are major arterial routes, quite capable of accommodating this relatively modest additional volume. In addition, the closure of James Street would enable the Corporation to consolidate and greatly enlarge the Queen Elizabeth Park.

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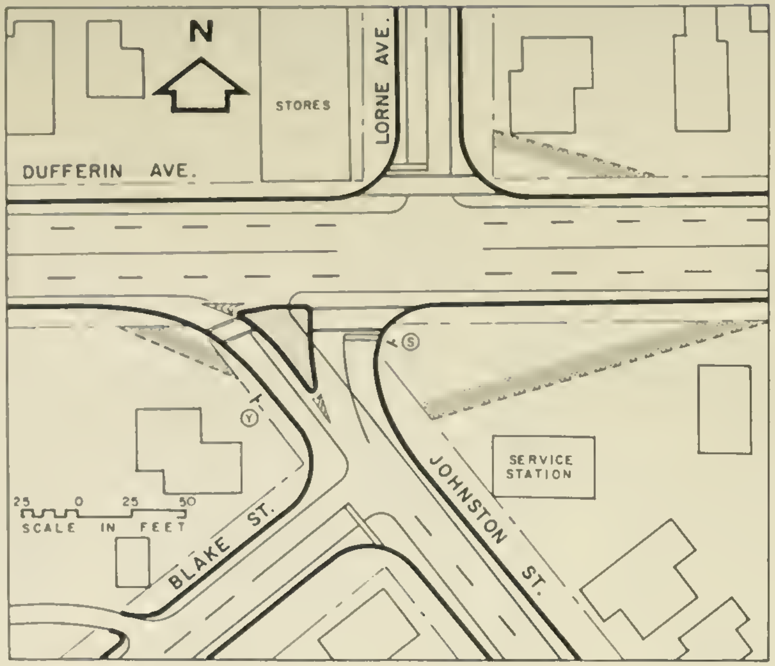
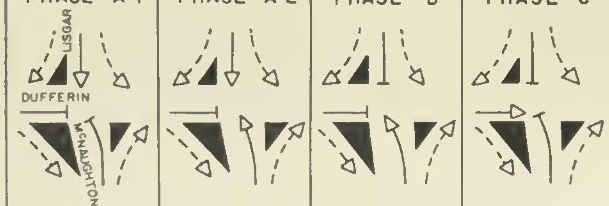
* Item numbers refer to Exhibit 4.B



DUFFERIN • LORNE • JOHNSTON INTERSECTION STAGE I



TIMES	PHASE A·1	PHASE A·2	PHASE B	PHASE C
GREEN SIGNAL	30% (22·0 sec)	10% (7·5 sec.)	35% (26·0 sec.)	15% (11·5 sec.)
AMBER DISPLAYS	—	—	5% (4·0 sec.)	5% (4·0 sec.)
CUMULATIVE	30% (22·0 sec)	40% (29·5 sec.)	75% (55·5 sec.)	95% (71·0 sec.)
TOTALS	—	—	80% (59·5 sec.)	100% (75·0 sec.)

NOTES: 1. A [illegible]-second cycle length has been assumed, based upon current traffic volumes, and upon those anticipated in the near future.

2. According to existing conditions, the phase pattern indicated here would be suitable for use throughout the day. However, phase length modifications and the establishment of additional phase patterns, for use during specified portions of the day, may be justified after a period of observation.

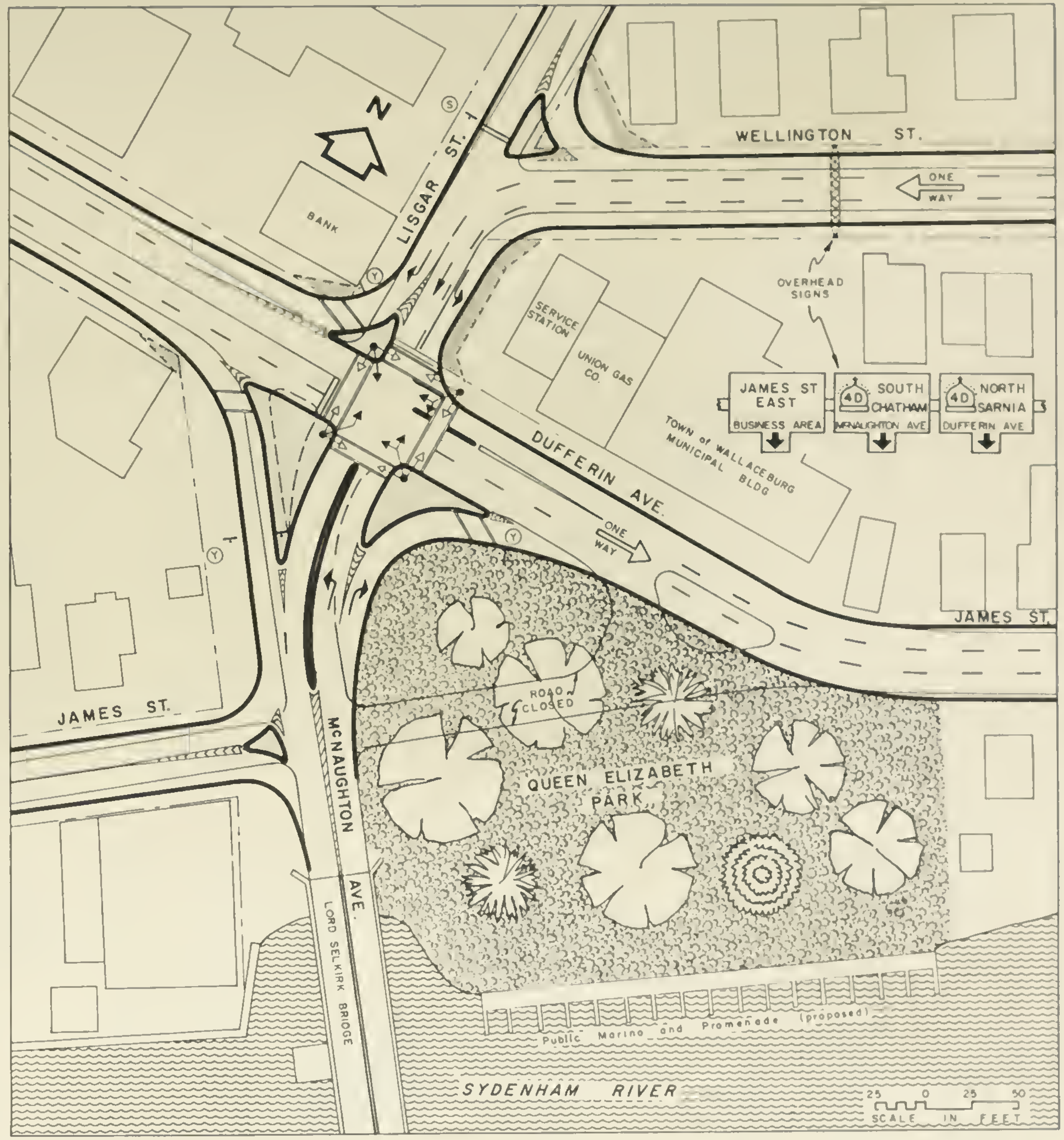
3. At the Dufferin/Lisgar McNaughton intersection, all right turn movements are afforded exclusive turning roadways. These movements, in addition to the southbound-to-eastbound left turn movement (all designated), may take place at any time, subject to pedestrian movements, and to delays caused by merging at yield signs.

4. When a traffic control signal is installed at the McNaughton Hillard intersection, provision should be made to integrate its operation with that of the Dufferin Lisgar McNaughton signal.

LEGEND

- LIMIT OF RIGHT-OF-WAY REQUIRED *
- TRAFFIC CONTROL SIGNALS
- PEDESTRIAN SIGNALS ("WALK / DON'T WALK")
- Ⓨ "YIELD" SIGN
- Ⓢ "STOP" SIGN

* PROPERTY WEDGES SHOWN AT INTERSECTIONS NEED NOT BE PURCHASED OUTRIGHT, BUT TOWN SHOULD ENSURE MAINTENANCE OF CORNER VISIBILITY (ie SIGHT LINES)



DUFFERIN • LISGAR • JAMES • WELLINGTON AREA STAGE I

Item I.3 - McNaughton Avenue (Lord Selkirk Bridge to Gillard Street):

Gillard Street - widened and otherwise improved - would become the principal east/west route south of the Sydenham River. All major traffic movements currently using the Wallace/Gillard corridor would be concentrated on the latter. Volumes of turning movements at the McNaughton/Gillard intersection would be quite high, and large trucks would constitute a significant proportion of overall flow. Exhibit 4.D portrays improvements which would enable this intersection to function efficiently under conditions of greatly increased usage. A study of anticipated movements indicated the desirability of providing at least one separate turning roadway (i.e. in the north-west quadrant): in addition, it is quite likely that traffic control signals would be warranted.

Item I.4 - Dufferin/Lorne/Johnston intersection:

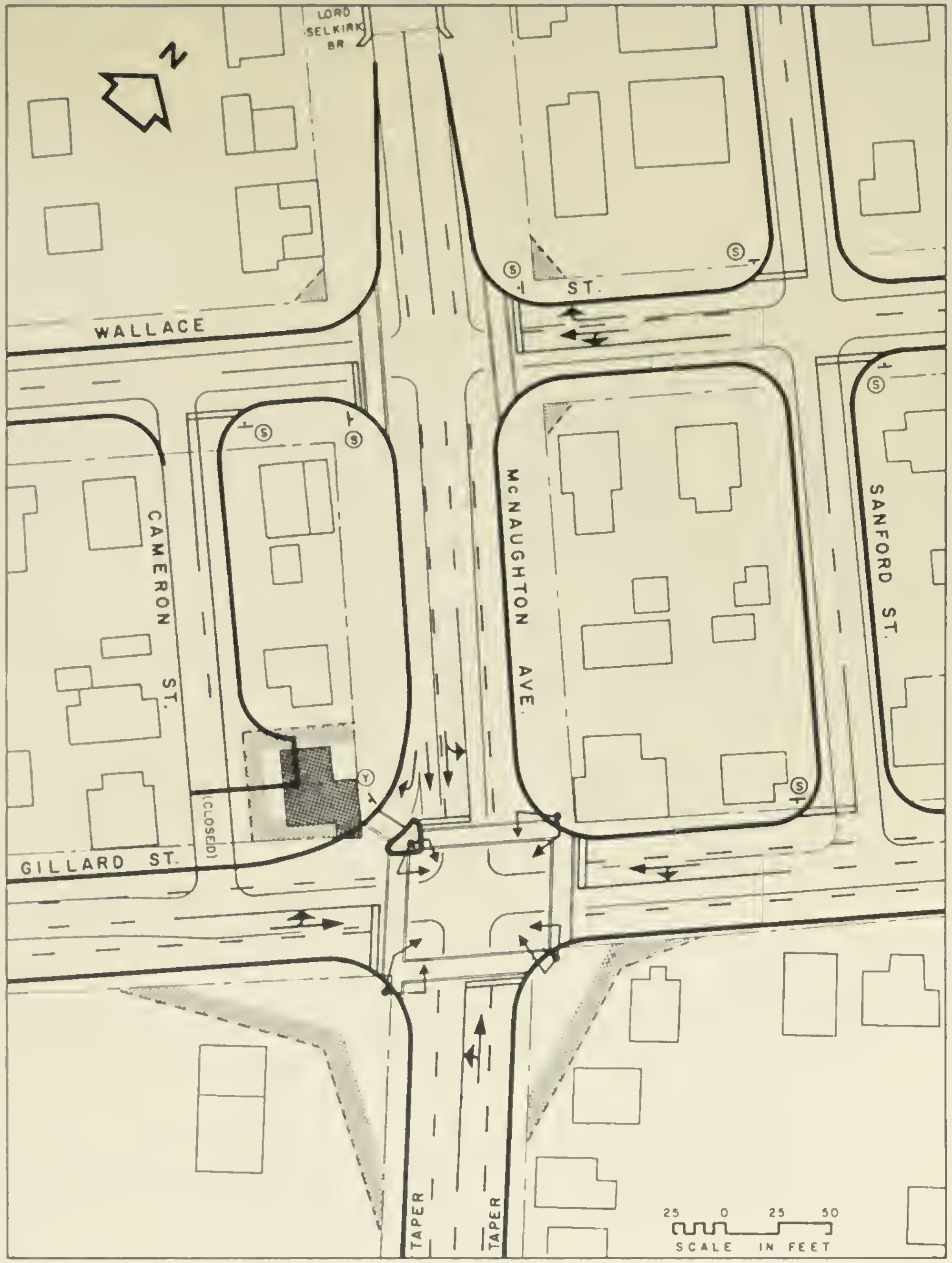
Some measure of physical improvement is required at this intersection - a "high accident frequency" location. The scheme indicated on Exhibit 4.C would straighten the badly skewed Johnston Street approach, and would require only a modest property easement in the south-east quadrant.

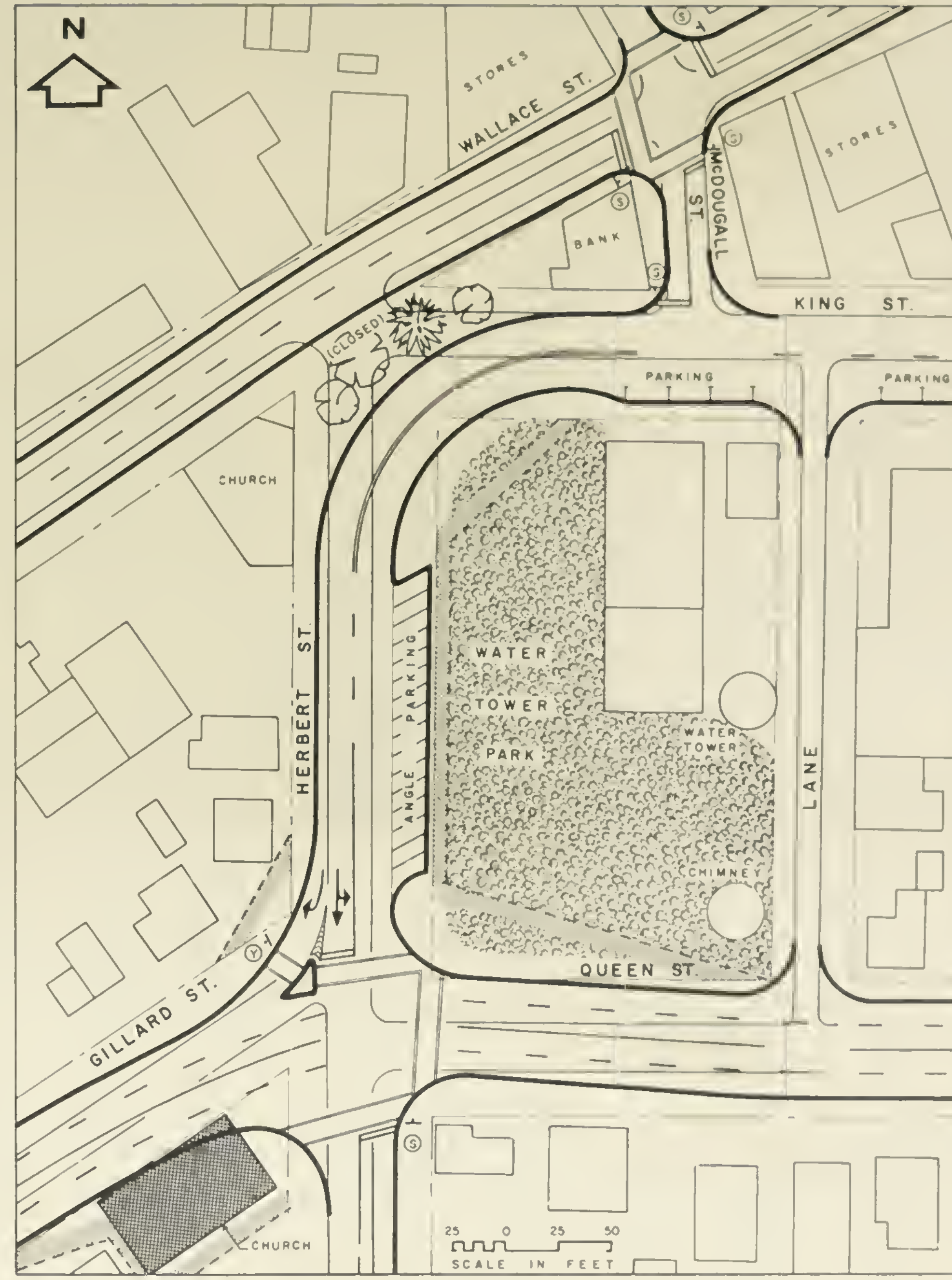
Item I.6 - Elgin Street Extension (east of North Branch, Sydenham River):

Once the Corporation decides to establish a second permanent crossing of the North Branch at Elgin Street, provision for a new major east-west route east of the North Branch must be made. It is strongly suggested that the required property be reserved almost immediately, before area subdivision plans are tabled.

Item I.10 - Gillard/Queen/Herbert intersection:

Visibility is severely restricted for drivers approaching from the south. When the Gillard/Queen route assumes greater importance, a jog elimination such as that portrayed on Exhibit 4.D must be undertaken. Herbert Street would become a distributor connecting the southern portion of the CBD with the Gillard/Queen/Murray "loop". Because of the curve in the Gillard/Queen alignment, it would be convenient to provide a separate turning roadway in the northwest quadrant, as illustrated.





McNAUGHTON · WALLACE · GILLARD AREA STAGE I

HERBERT STREET AREA STAGE I

LEGEND

- LIMIT OF RIGHT-OF-WAY REQUIRED *
- STRUCTURE TO BE REMOVED
- TRAFFIC CONTROL SIGNALS
- (S) "STOP" SIGN
- (Y) "YIELD" SIGN

* PROPERTY WEDGES SHOWN AT INTERSECTIONS NEED NOT BE PURCHASED OUTRIGHT, BUT TOWN SHOULD ENSURE MAINTENANCE OF CORNER VISIBILITY. (i.e. SIGHT LINES)

Item I.11 - Murray Street/Main Street; connection across Sydenham River (East Branch):

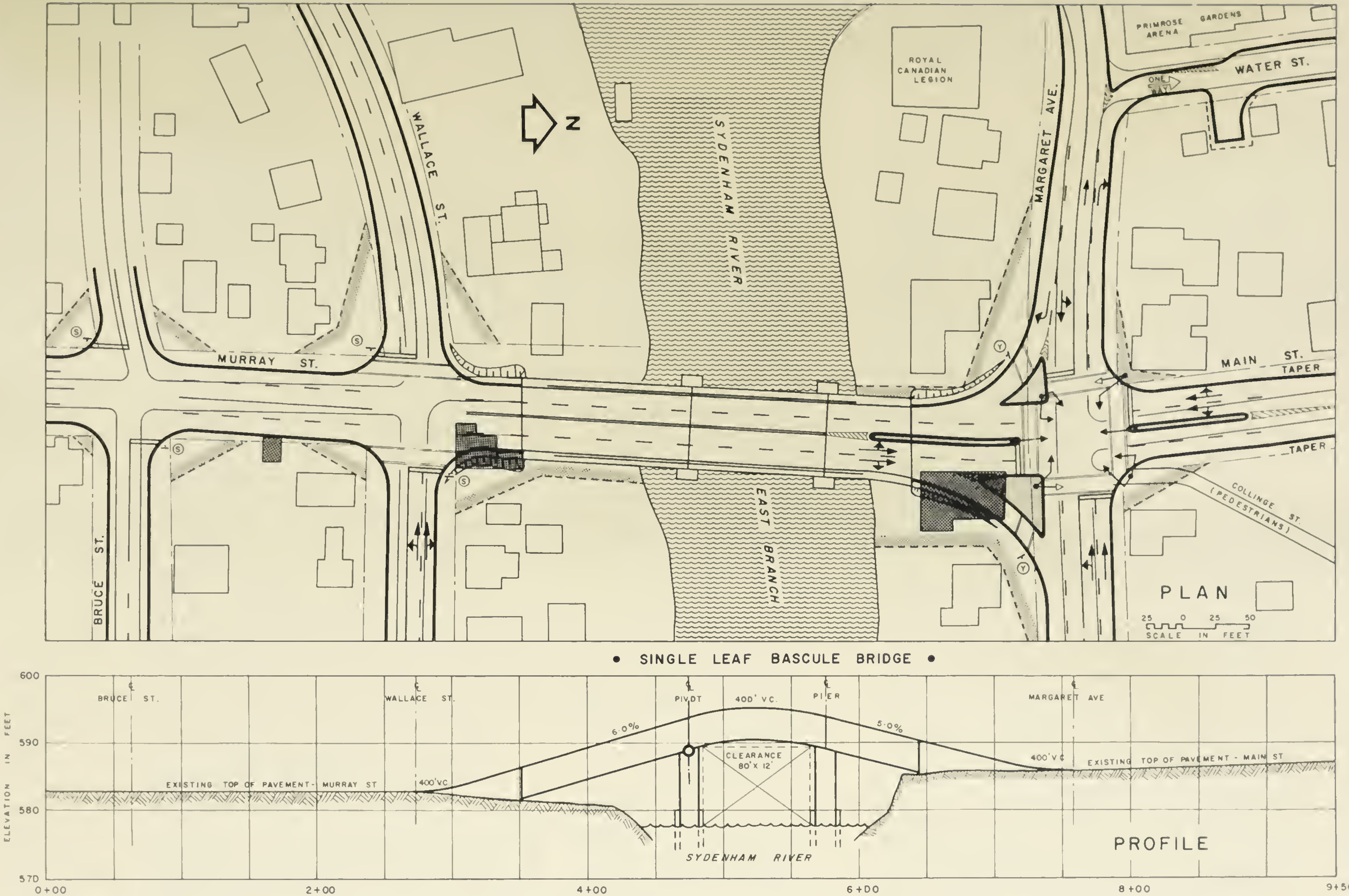
Item I.12 - Margaret Avenue (Dundas Bridge to Dundas Street):

Item I.13 - Murray Street (Wallace Street to Queen Street):

The new East Branch crossing would be the key element of an extremely important north/south route formed by Murray and Main Streets. The Margaret/Main intersection, forming a link, as it were, between the new bridge and the existing Dundas Bridge, would be the scene of very heavy turning movements. The junction would represent the convergence of several major traffic flows, including those generated by:

- the rapidly developing north-eastern portion of the urban area (via Margaret Avenue and Main Street),
- the central business district (portions north and south of the Sydenham River),
- the industrial area (via the Gillard/Queen and the Murray/Base Line routes),
- the Highway 78/Highway 40 (south) external travel demand.

In order to operate efficiently, separate turning roadways and other channelization should be provided, as indicated on Exhibit 4.E. As in the case of the Dufferin/Lisgar/James/Wellington complex, the Margaret/Main intersection would always be subject to back-ups and "surges" of traffic during the navigation season when frequent openings of the new bridge could be expected. Therefore, adequate vehicle storage space must be provided, especially in view of the close proximity of Margaret Avenue to the bridge structure itself. Moreover, the shortness of the approach, coupled with clearance requirements (12 feet minimum, above high water level) would engender quite steep grades on the main north-south route and on both separate turning roadways; this only serves to emphasize the importance of channelization, traffic signal placement and adequacy of storage space as design considerations.



LEGEND

- LIMIT OF RIGHT-OF-WAY REQUIRED *
- STRUCTURE TO BE REMOVED
- TRAFFIC CONTROL SIGNALS
- PEDESTRIAN SIGNALS ("WALK/DON'T WALK")
- "STOP" SIGN
- "YIELD" SIGN

* PROPERTY WEDGES SHOWN AT INTERSECTIONS NEED NOT BE PURCHASED OUTRIGHT, BUT TOWN SHOULD ENSURE MAINTENANCE OF CORNER VISIBILITY. (I.e SIGHT LINES)

SYDENHAM RIVER EAST BRANCH CROSSING
AND RELATED IMPROVEMENTS
STAGE I

Related comments could be made concerning the steeply graded southern approach to the proposed bridge. The Wallace/Murray intersection is situated very close to the bank of the river: indeed, if the bridge were to be developed as illustrated, this intersection would occur precisely at the toe of a 6 per cent grade. In addition, visibility could well be restricted to the north, over the crest vertical curve. Therefore, it is suggested that all left turns be prohibited at the Wallace/Murray intersection. Since it is proposed that the Gillard/Queen route would take over Wallace Street's present function as the major east-west route south of the river, the turning movements banned at Wallace Street could be made more efficiently - and far more safely - at the Murray/Queen intersection: because of the potentially heavy turning movements, a separate turning roadway in the north-west quadrant, and traffic control signals, would probably be justified.

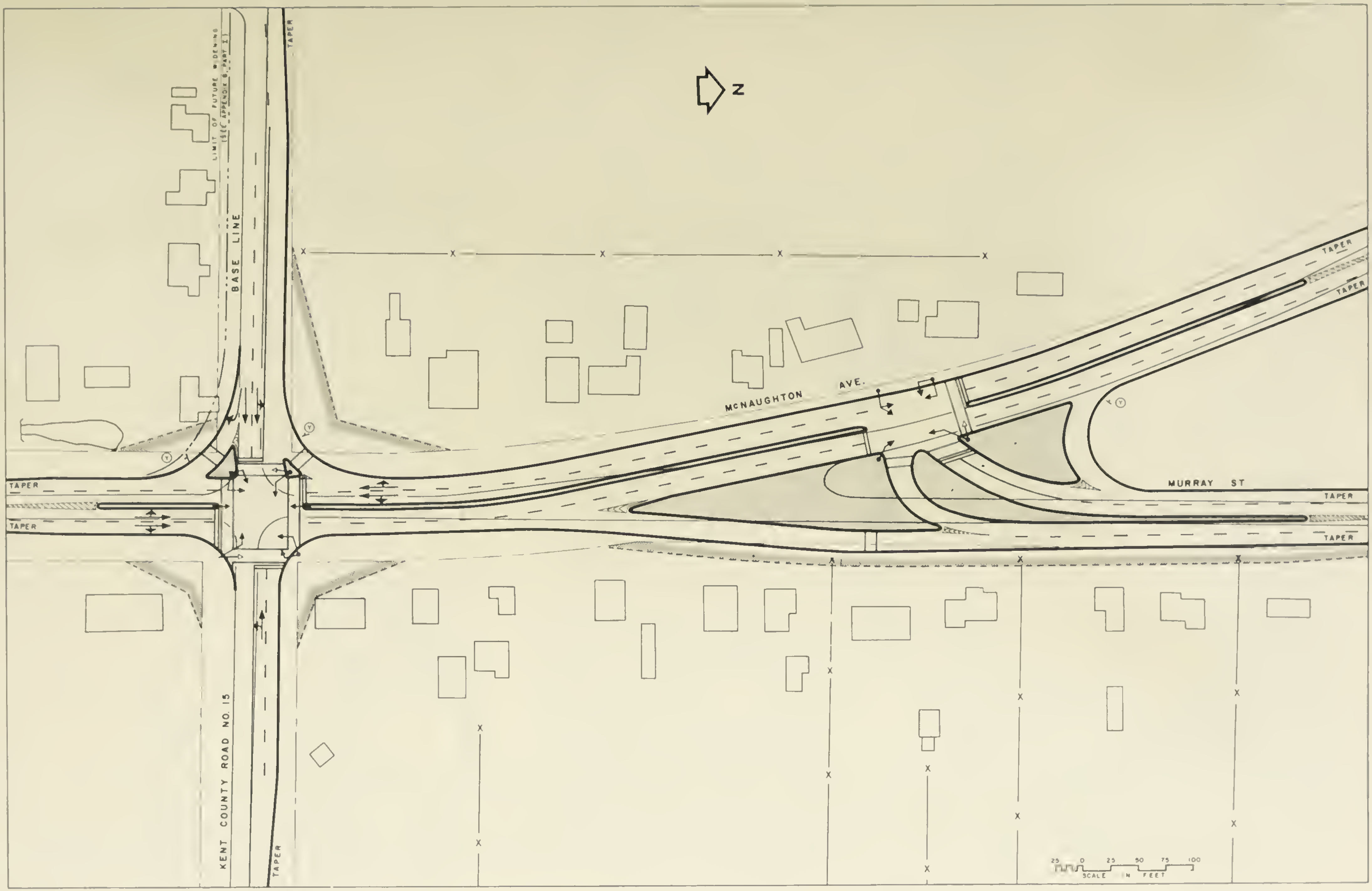
****

As shown on Exhibit 4.E, the Margaret/Water intersection should be modified to permit only the westbound-to-northbound right turn. The intersection is much too close to the two-lane Dundas Bridge to allow for efficient operation, even under prevailing conditions of traffic flow and visibility: as demands increase, turning movements here - particularly the eastbound-to-northbound left turn - would cause severe turbulence and delay. Park/Main would represent a convenient alternative route.

<u>Item I.14</u> - <u>McNaughton/Murray/Base Line vicinity</u>:

Murray Street would assume new importance as a north-south arterial route, if a new East Branch crossing were provided in the recommended location. Obviously, some physical improvement of the McNaughton/Murray intersection would be essential, and Exhibit 4.F portrays the recommended ultimate development. Pavement widening, full channelization and traffic signals at both intersections are included, and it is confidently expected that capacity would be adequate to handle anticipated 1985 volumes.

It is strongly felt that a quite elaborate improvement is justified. Whereas today, McNaughton Avenue is far more heavily travelled than either Murray Street or Base Line, the provision of a new bridge across the East Branch of the Sydenham River would lead to sub-



LEGEND

- LIMIT OF RIGHT-OF-WAY REQUIRED *
- TRAFFIC CONTROL SIGNALS
- PEDESTRIAN SIGNALS ("WALK/DON'T WALK")
- "YIELD" SIGN

* PROPERTY WEDGES SHOWN AT INTERSECTIONS NEED NOT BE PURCHASED OUTRIGHT, BUT TOWN SHOULD ENSURE MAINTENANCE OF CORNER VISIBILTY (i.e. SIGHT LINES)

MURRAY · McNAUGHTON · BASE LINE AREA
STAGE I

stantially increased flows on these two routes. Hence, the complex shown on Exhibit 4.F would represent the confluence of several important movements, and furthermore, any problems arising from traffic stream conflicts would be intensified because of the relative closeness of the two intersections.

If the Corporation and the Department of Highways so decide, this project could be accomplished in stages. The first objective should be the improvement of the Murray Street approach to McNaughton Avenue; i.e. Murray Street should intersect McNaughton Avenue at an angle as close as possible to 90 degrees. The northbound movement could continue to take place on the existing Murray Street alignment, as suggested by the illustration.

Item I.16 - Wallace/King/Herbert intersection:

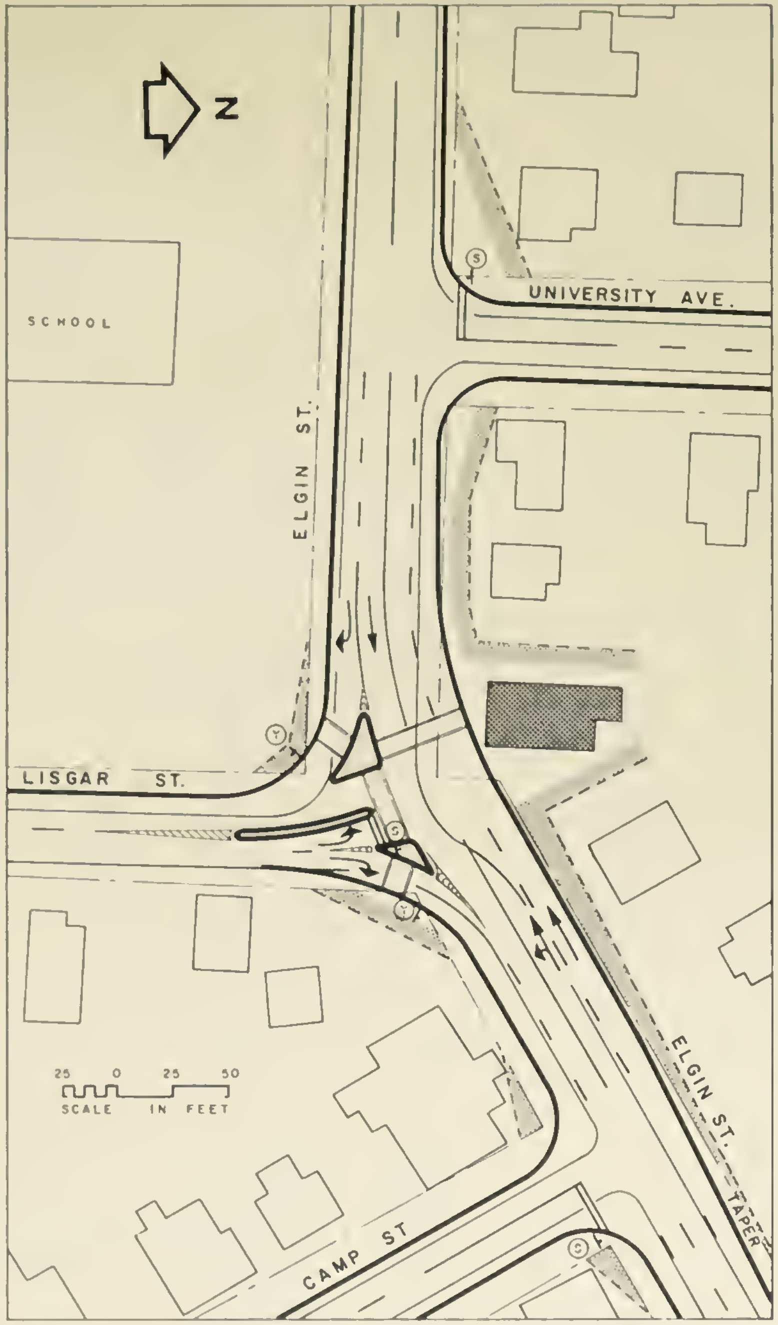
At present, driver visibility is severely restricted on all approaches to this junction. The angles of approach are skewed, and the lack of setback provided by the church effectively rules out any worthwhile modifications, assuming all traffic movements must be maintained. However, the establishment of Gillard/Queen as the major east-west route would make it unnecessary to maintain all movements at the Wallace/King/Herbert intersection. As shown by Exhibit 4.D, Wallace Street and Herbert/King could become separate distributors serving the commercial area south of the Sydenham River: both would intersect major routes at several points and would themselves be interconnected by McDougall and Bridge Streets - as at present.

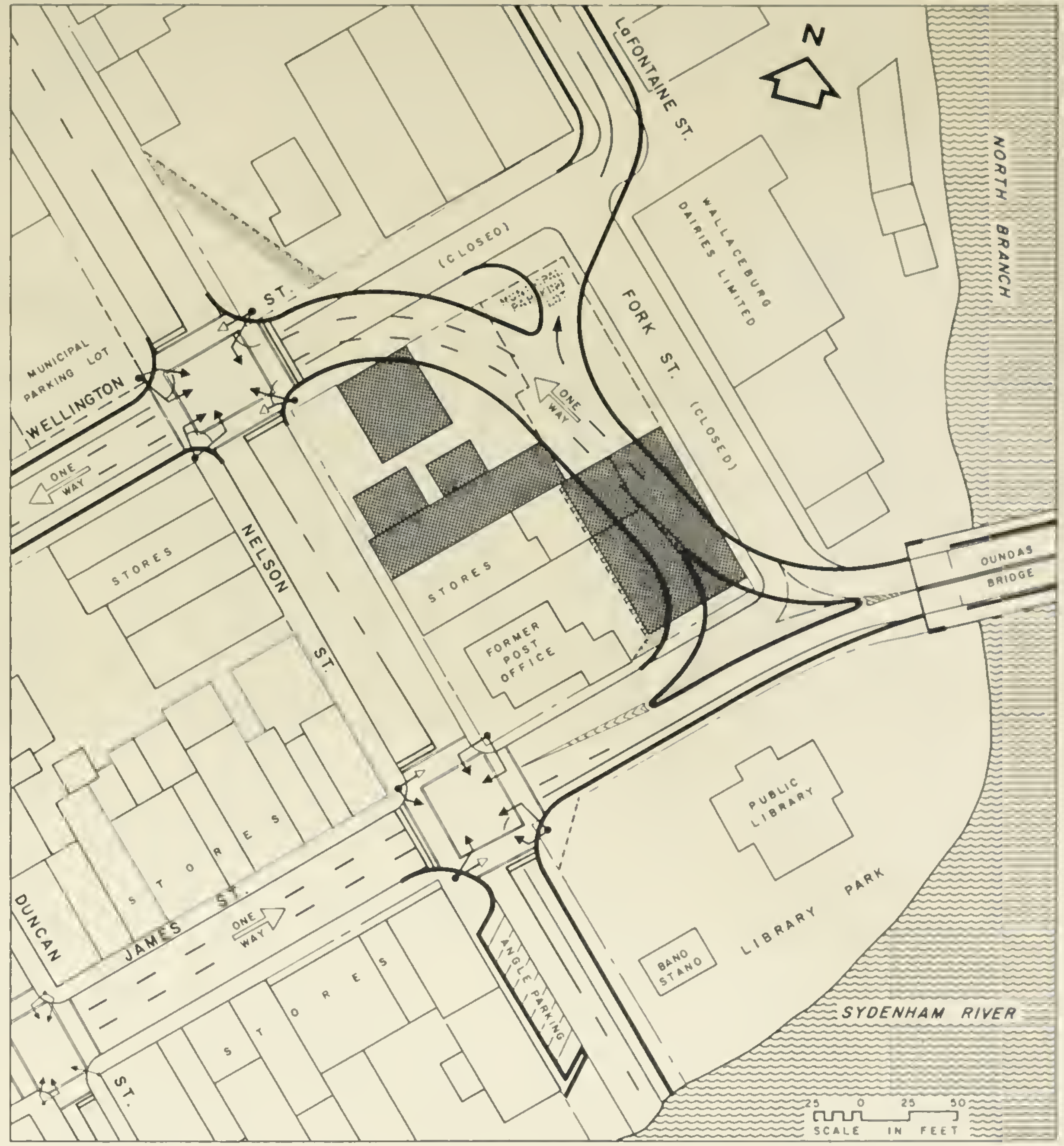
4.1.4.2 Stage II: 1971 - 1975

Item II.1 - Wellington Street (realignment of east end):

As traffic volumes increase throughout the CBD. and particularly on the James/Wellington one-way "couplet", the sharp turns at both ends of Fork Street will inevitably create a "bottleneck" in this vitally important east-west corridor: Exhibit 4.G indicates a solution to this problem.

The termini of one-way street systems are important points on the major route network, and must be afforded special treatment. Relatively large numbers





ELGIN · LISGAR INTERSECTION
STAGE II

REALIGNMENT OF WELLINGTON STREET
STAGE II

LEGEND

- LIMIT OF RIGHT-OF-WAY REQUIRED *
- STRUCTURE TO BE REMOVED
- TRAFFIC CONTROL SIGNALS
- PEDESTRIAN SIGNALS ("WALK/DON'T WALK")
- "STOP" SIGN
- "YIELD" SIGN

* PROPERTY WEDGES SHOWN AT INTERSECTIONS NEED NOT BE PURCHASED OUTRIGHT, BUT TOWN SHOULD ENSURE MAINTENANCE OF CORNER VISIBILITY. (I.e. SIGHT LINES)

of circulating trips pass through the James/Wellington/Nelson area, and it is essential to provide separate turning roadways and advanced operational features in order to avoid congestion and delay. As indicated, traffic control signals at both the James/Nelson and the Wellington/Nelson intersections may be warranted to complement the more fundamental physical changes.

Most of the structures marked for demolition on Exhibit 4.G are old commercial buildings; i.e. the opportunity would be afforded to combine the roadway improvement with a redevelopment project worthy of complementing the Library Park and its fine view of the river.

Item II.5 - Elgin Street (Nelson Street to Lisgar Street):

Item II.6 - Elgin/Lisgar Intersection

Elgin Street would assume new importance as a major east-west route, if a second permanent crossing of the North Branch is provided at the recommended location. Pavement widening in general, and the improvement portrayed by Exhibit 4.G in particular, would lead to increased capacity on the important section of Elgin Street which lies north of and parallel to the axis of the CBD.

4.1.4.3 Stage III: 1976 - 1980

Item III.1 - Elgin Street/Miles Street; connection across Sydenham River (North Branch):

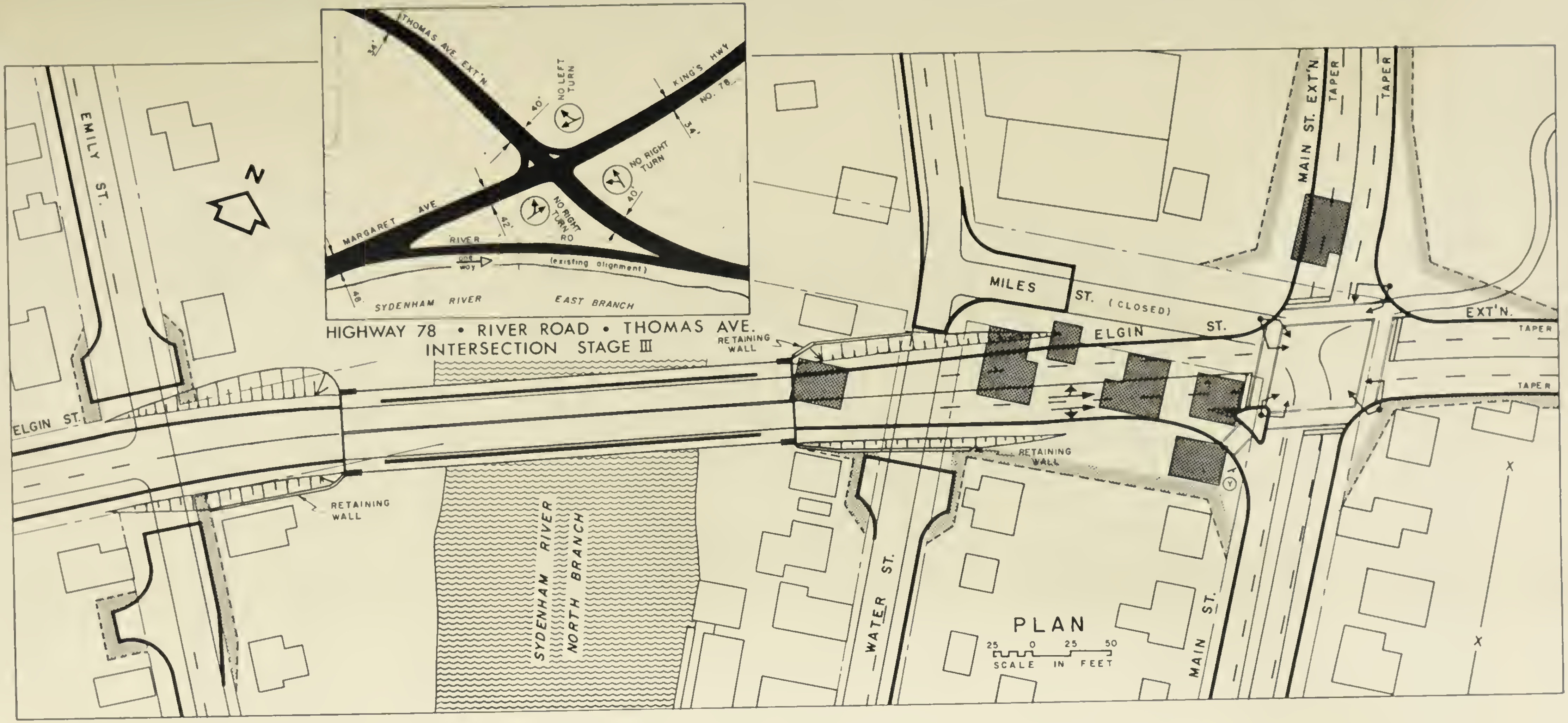
Item III.2 - Elgin Street (Nelson Street to Emily Street:

Item III.3 - Main Street (Margaret Avenue to Elgin Street Extension):

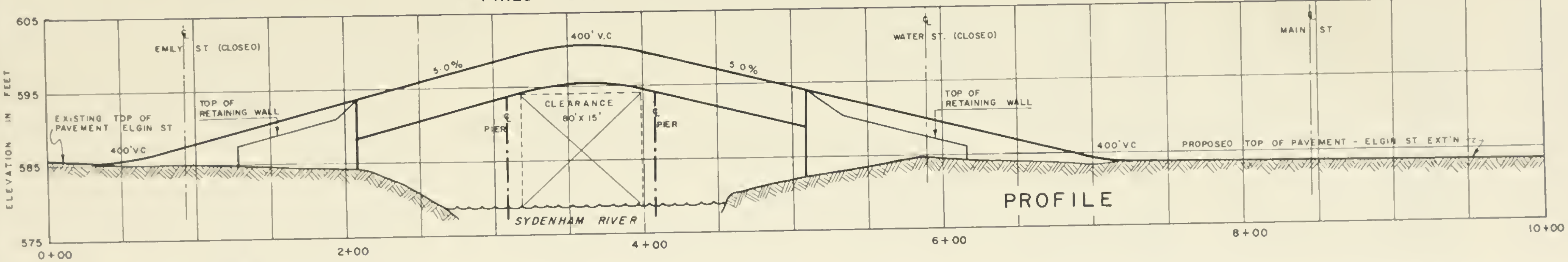
Item III.4 - Murray Street (Queen Street to McNaughton Avenue):

Item III.8 - Main Street Extension (north of Elgin Street Extension):

As indicated on Exhibit 4.H, Emily, Miles and Water Streets would have to be closed to make way for bridge approaches. Several houses would have to be either demolished or moved, in the interests of achieving



• FIXED BRIDGE •



LEGEND

- LIMIT OF RIGHT-OF-WAY REQUIRED *
- STRUCTURE TO BE REMOVED
- TRAFFIC CONTROL SIGNALS
- "YIELD" SIGN

* PROPERTY WEDGES SHOWN AT INTERSECTIONS NEED NOT BE PURCHASED OUTRIGHT, BUT TOWN SHOULD ENSURE MAINTENANCE OF CORNER VISIBILITY (Ie SIGHT LINES)

SYDENHAM RIVER - NORTH BRANCH CROSSING

AND RELATED IMPROVEMENTS

STAGE III

good horizontal and vertical alignments. Any attempt to "save" certain properties would drastically reduce the traffic safety and efficiency aspects of the new facility.

Main Street would become a strategic north-south link between the East and North Branch crossings, and heavy turning movements at the Main/Elgin (Extension) intersection would justify the separate turning roadway and traffic control signals illustrated.

Main Street would replace Water Street as the principal north/south route east of the North Branch. Water Street has a very narrow right-of-way, and is discontinuous at Margaret Avenue. Moreover, well-designed intersections cannot be provided between Water Street and any east-west route, because of the former's close proximity to the waterway. Main Street and its northern extension could easily be developed - along with Murray Street - to arterial route standards: it would tie together major industrial and residential areas, and would intersect every important east/west route in the Wallaceburg area.

Item III.6 - Highway 78/River Road/Thomas Avenue Extension intersection:

The Elgin Street Extension - which would include Thomas Avenue and its extension - should end at this point, in order to prevent it from appearing too attractive as a Highway 78/Highway 40 (north) by-pass. The value of a greatly improved Margaret Avenue/River Road intersection should not be under-estimated, for the layout shown on Exhibit 4.H would lead to increased safety, and would function as an efficient distribution point for traffic using the two principal east/west routes north of the Sydenham River.

Item III.11- Creek Street and Brander Avenue (James/Creek to University/Brander):

It is felt that this route should be upgraded, as it were, to the status of a collector/distributor route, connecting the CBD with residential neighbourhoods to the north. It would intersect the James/Wellington one-way "couplet" and Elgin Street.

When a second crossing of the North Branch is provided at Elgin Street, north/south traffic movement would

increase considerably between Elgin Street and the CBD, particularly on Nelson Street. If Creek Street is widened and otherwise improved, it could relieve the pressure on Nelson Street, by serving most trips generated west of Duncan Street.

4.1.4.4 Stage IV: 1981 - 1985

Item IV.1 - Queen Street (Murray Street to C. & O. Railway crossing)

Item IV.2 - Queen Street Extension (east of Albert Street, parallel to C. & O. Railway):

This would represent an ultimate extension of the Gillard/Queen arterial route, and would replace the narrow, circuitous Wallace Street as a major "feeder" into the CBD.

As indicated on Exhibit 4.A, King Street and Wallace Street should intersect the new route at angles approaching 90 degrees, in order to avoid the disadvantages inherent in skewed approaches. This is especially important here in view of the Chesapeake and Ohio Railway, would would be parallel and quite close to the new route. The design of these intersections should be similar in concept to that illustrated by Exhibit 4.F (i.e. the McNaughton/Murray intersection), but could be far less elaborate in form.

4.1.5 PARKING AND CIRCULATION IN THE CENTRAL TRAFFIC DISTRICT

4.1.5.1 Curb Parking - Restrictions and Prohibitions:

Overall route capacity depends largely upon intersection capacity, since intersections represent those critical points where traffic streams are stopped, segregated, merged and otherwise subjected to delays. Several recommendations herein arise from the fact that curb parking stalls on major routes (e.g. James Street, Nelson Street) are provided very close to intersections: the result is usually a severe restriction of intersection capacity. Measures such as curb parking prohibition, limited to a few strategic points, are very economical to implement, and could lead to truly dramatic increases in overall network efficiency.

Certain of the items presented in Appendix N are aimed at increasing major route capacity in general. For example, it is recommended that all curb parking on the north side of James Street between Dufferin Avenue and Fork Street be prohibited as soon as possible. At first glance, this might appear to be an unnecessary and all-too-drastic move; hence, certain facts should be emphasized:

(a) James Street is not only the principal commercial thoroughfare of Wallaceburg, but is also a King's Highway route. Therefore, it is called upon to carry long-distance through traffic in addition to local traffic generated by the business area, including the inevitable "circulating traffic" characteristic of such districts.

(b) It is obvious that James Street is forced to carry quite heavy traffic throughout the business day. In addition, the street is used for vehicle storage (i.e. curb parking); hence, its effective travelled width is quite often reduced to barely one lane, because of the high frequency of parking/unparking manoeuvres.

(c) All municipal off-street parking facilities lie north of James Street. Thus, in order to avoid any disadvantage to merchants on the south side of the street, it is suggested that curb parking be retained on that side for the next five or six years (i.e. until increased

traffic volumes lead inevitably to the prohibition of all curb parking on James Street). Moreover, right-hand side parking is considered "normal" (i.e. as on any two-way street where curb parking is allowed), and hence, manoeuvres related to such parking are more easily and safely performed by the average driver.

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As the area between Wellington and Elizabeth Streets becomes more commercial and institutional in character, it may be worthwhile to consider imposing curb parking prohibitions on some of the more narrow north/south streets. This would enhance the efficiency of area traffic flow, and would encourage drivers to use off-street parking facilities. In addition, when a municipal lot is established, a number of curb parking spaces equivalent to at least one-half of the lot capacity should be abolished on nearby streets: normally, such a policy would result in the removal of curb parking on both sides of all streets surrounding the facility. These restrictions should also be applied on streets adjacent to existing municipal lots.

It is gratifying to learn that the Town plans to continue providing reasonably priced off-street space, attractive to both medium- and long-term parkers. Naturally, revenues derived from parking meters (both curb and off-street) should be applied toward meeting the cost of this long-term program. However, fees charged at municipal lots should be graduated to attract short-term parkers as well as those desiring longer parking periods, and should, if possible, be LESS than the fees set for nearby curb meters.

For example:

<u>Curb Meters</u>:
- minimum fee: 5¢ (for periods up to and including 30 minutes),
- 10¢ for one hour,
- 20¢ for two hours

Off-street Meters: - minimum fee: 5¢ (for periods up to and including 45 minutes),

- 10¢ for 90 minutes,

- 10¢ for each additional 90 minutes, up to a maximum charge of 50¢.

As the foundation of a general policy, the Corporation should attempt to focus public attention upon its excellent off-street parking facilities. This could be done through suitable advertising, the encouragement of merchants to dispense "parking tokens", and by other appropriate means.

4.1.5.2 Parking Space - Deficiencies and Requirements:

Existing accommodation appears to satisfy normal overall parking demands: however, Appendices N and O list 76 (net) curb spaces which should be eliminated from CTD streets. If these recommendations are carried out, peak parking hour (i.e. maximum level) space usage would likely exceed the critical 85 per cent level in only one O-D zone*, and would approach it in only one other zone**. The development of a large municipal lot west of Nelson Street, between Wellington and Elizabeth Streets, was initiated during 1964. Surely this new facility would more than offset the minor 10- or 12-space deficiency which would theoretically result from all curb space removals recommended herein.

Eventually, all curb parking should be banned on routes such as James, Nelson and Wallace Streets within the CTD: the parking space thus eliminated would be replaced on municipal off-street facilities. It is strongly recommended that Wallaceburg's excellent system of municipal lots be expanded progressively, together with a parallel program of curb parking prohibition.

Based upon the projected growth of the Town, it is estimated that between 150 and 250 additional off-street stalls will be required to satisfy demand within the central traffic district by 1985. Admittedly,

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* Zone 140: peak parking hour usage would be approximately 88 per cent,

** Zone 120: peak parking hour usage would be approximately 80 per cent.

this is a rough estimate, based solely upon the available projections of population and commercial activity, but it does indicate the general magnitude of future parking needs. Considering the potential size and the relatively moderate growth rate envisaged for the Town, the recommended program may be viewed as a long-term proposition: land required for additional lots could be assembled slowly, as and when it becomes economically feasible to do so.

Unfortunately, it was observed that municipal parking lots in general were being very lightly used despite their commendable standards of accessibility, layout, fee structure and overall convenience. Hence, the adoption of concerted efforts aimed at increased lot usage becomes even more imperative than the considerations outlined earlier would indicate.

Finally, it should be stated that no parking space deficiency was noted in Zone 150, south of the Sydenham River. However, space requirements there could change due to redevelopment, and it is hoped that parking will be carefully considered as and when any such plans are formulated. Indeed, it is understood that a municipal lot is soon to be established between Wallace Street and the Sydenham River, in connection with the development of a riverside park east of McDougall Street.

4.1.5.3 Parking Meters - Appraisal and Recommended Time Limits:

The Simplified Parking Study carried out in Wallaceburg does not provide detailed information concerning long-term parking demand, because of the special nature of the supporting origin and destination survey. Nevertheless, the supply and usage tabulations presented in Appendix M suggest modifications which could be usefully applied to existing meter time limits and fees.

Appendix N sets out all recommended changes in detail, whereas Appendix O indicates the potential effect of these changes upon the number and distribution of metered and non-metered CTD curb spaces on a zonal basis. The object is to make available more short-term (i.e. 12-minute and 30-minute) meters through the conversion of one-hour and two-hour meters. In addition, two-hour meters would be installed where appropriate, at locations presently offering non-

metered curb parking. Further recommendations are set forth in the NOTES attached to Appendices N and O.

4.1.5.4 Illegal Parking and Law Enforcement:

The Simplified Parking Study indicates that relatively little illegal parking takes place in the central traffic district. Generally, existing regulations are quite well enforced, although certain metered curb locations (e.g. on James Street, within O-D Zone 120) appear to harbour a disproportionately large number of illegal and/or overtime parkers.

It should be emphasized that the practice of overtime parking at meters (including "meter-feeding") detracts from the prime advantage of these devices; i.e. that their presence will lead to a relatively high rate of parking turnover, which in turn will allow more vehicles to be stored efficiently in more convenient locations.

Municipal officials everywhere must be ready to accept the criticism which often results when parking regulations are stringently and impartially enforced. It is obvious that such enforcement benefits the public in general, while it is only a small but frequently vocal group which may be adversely affected. The basic aim may be simply stated:

> *Long-term parkers must be encouraged to use either off-street accommodation, or curb spaces far removed from areas of intense usage and demand in the core of the central business district.*

4.2 IMPLEMENTING AND UPDATING THE PLAN

4.2.1 THE TRAFFIC PLANNING STUDY - A GENERAL REVIEW

A sound transportation plan may be implemented only when all interested parties analyze the study principles together with findings and proposals, and eventually discover for themselves what has been done and what must be accomplished in the future.

After examining the plan, it is possible that various groups will bring forward amendments which could be usefully reviewed and compared with the recommendations tabled herein. However, before any fundamental changes, deletions or additions are made, a careful recapitulation of the basic conditions and principles of the study should be undertaken, to ensure that suggested revisions would indeed be superior to original proposals. Such a review must be founded upon a full appreciation of the several factors which have influenced the development of the 20-year plan:

(a) The study is based upon an "average weekday", and the route capacities upon which most proposals depend, are themselves based upon certain assumptions regarding peak hour volumes. Any significant changes in shopping hours or plant schedules which would drastically alter daily travel patterns would just as drastically affect the major route system and the plan.

(b) The plan refers to a comprehensive system of traffic facilities. Any major modifications applied to one or more individual proposals must, in turn, affect other elements throughout much or perhaps all of the system.

(c) The plan is based upon projections of population, commercial floor space, industrial employment and motor vehicle usage, over the 20-year planning period. Moreover, it is assumed that future land use distribution will follow current trends and will be in accordance with the Official Plan of the Wallaceburg Planning Area. Major variations in any of these projections will profoundly affect future travel demands, and consequently, the justification for and priorities of various proposals.

(d) Whether or not the projected land use pattern develops by the year 1985, it must be realized that Wallaceburg will continue to expand beyond that date. Hence, the plan must allow for further extensions and improvements of the major route system, perhaps involving additional crossings of the Sydenham River.

(e) The plan in its present form is largely conceptual. Before the proposals can be implemented, they must be functionally designed: this would involve detailed consideration of route function, design standards, soil conditions, drainage and the many other factors essential to consider in developing new or improved routes.

(f) Future traffic assignments and detailed recommendations are based upon the theoretical operation of the completed (1985) network. No evaluation has been made of how improvements would function during various interim periods prior to the completion of the total plan. As each project is put forward for implementation, consideration should be given to both its short-term and ultimate effects upon system-wide travel and traffic patterns.

(g) No detailed (i.e. origin/destination) data was obtained for non-river-crossing trips internal to the Department of Highways (external) cordon. Under prevailing conditions, the large number of ATR and intersection turning movement counts taken during the course of the field survey, allowed volumes and approximate orientations of such trips to be ascertained quite accurately. However, as the urban area expands and becomes more complex, and as additional river crossings increase the range of alternative routings, other more definitive origin and destination surveys - based upon screen lines or even upon closed cordons - may become warranted.

4.2.2 IMPLEMENTATION AND ADMINISTRATION

After the plan has been carefully reviewed, it should be formally adopted as an article of policy. Necessary modifications should be applied to other articles of policy which might be affected: perhaps most important, the Official Plan should be amended where

required, to incorporate the approved plan of transportation improvements. In addition, every effort should be made to publicize the plan, so that all individuals and agencies concerned might be made aware of the proposals.

Following the adoption of the plan, the Corporation and the Ontario Department of Highways should discuss the matter of King's Highway Connecting Links, with a view to implementing any changes indicated by a review of external traffic movements into, out of and through the Wallaceburg area.

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Potential benefits arising from plan implementation will be greatly enhanced if a large measure of advance planning can be undertaken early in the planning period. With regard to property acquisition, it may often prove advantageous to purchase required land as and when it comes onto the market, rather than to wait until a project is about to be started and then be involved in tedious expropriation, involving additional expenditures due to "forced sales" and increased land values. Even if early property acquisition is not feasible, some form of restrictive covenant should be sought, which would effectively limit improvement or redevelopment of property ultimately required for roadway development.

There is no substitute for sound land use control when the value of the transportation network is at stake. Land use planning, however, is a two-sided coin; i.e. it is necessary not only to protect neighbourhoods from disruption due to the infiltration of heavy, non-potential traffic flows, but also to ensure that major routes function efficiently, free from restrictions imposed by incompatible land uses. For example: local residential streets should be so laid out that through traffic movement is discouraged, but this does not mean that residential areas should not contain any "through streets". Such areas generate large numbers of trips, and therefore, collector routes interior to each neighbourhood are essential.

Finally, after all financial aspects have been explored, the municipal budget should be reorganized, if necessary, to reflect the Corporation's intentions respecting the implementation of the plan.

4.2.3 TRAFFIC ENGINEERING RESPONSIBILITY

Quite apart from general engineering, land use planning and property acquisition, there exists a pressing need to continually review and reappraise the long-range proposals tabled in this report. Project staging depends upon the location and density of urban development during the next twenty years: should the area fail to develop in accordance with the land use plan adopted as a basis, priorities of certain projects may be reduced, while others may have to be greatly advanced. Hence, it becomes necessary to update this study periodically. Such duties are normally the joint responsibility of traffic engineering and planning agencies within the municipal organization: it is therefore suggested that all required traffic surveys be undertaken by the Town Engineer and by the Planning Board, assisted when necessary by a consultant.

The municipal engineering department should also wield authority in all matters pertaining to the installation and maintenance of traffic control devices. Thus, it is imperative that close liaison be established with the Wallaceburg Police Department, as both agencies share a primary interest in safety and improved traffic operations.

4.2.4 UPDATING THE PLAN

Although the recommended plan and staging are intended to span a twenty-year period, the growth projections will require constant review to ensure that development is in fact occurring as currently predicted. The annual construction programs should allow for changing conditions as and when these become apparent, and a thorough review - indeed, a virtual "overhaul" - of the plan should be undertaken every five to ten years, in order to check the effects upon the system of works already implemented, and to extend the range of the plan further into the future. It should be noted that many elements of the recommended major route network are expected to be operating at or near capacity by the year 1985: therefore, additional improvements will certainly be required in order to accommodate increasing travel demand beyond that date.

It is vitally important that a continuing program of traffic data collection and analysis be established in Wallaceburg, involving procedures complementary to those employed in the preparatory stages of this study.

Information so gathered would enable the Corporation to see that elements of the recommended plan are implemented as and when warranted, in a logical sequence: moreover, many of the surveys would be of considerable value in dealing with day to day operational problems.

Procedures should include:

(a) Internal Cordon Counts

These would provide data concerning general trip routings, trip generation and parking demand within the central business district. The cordon established in connection with the Simplified Parking Study encloses O-D Zones 110, 120, 130, 140 and 150 - an area sufficiently large to accommodate any foreseeable expansion of the CBD. A regular schedule of counts taken on each street crossing the cordon would indicate volumetric changes and diversions in routing resulting from:

- the improvement of routes parallel to the James/Wellington one-way "couplet", and to Wallace Street,
- the establishment of additional crossings of the Sydenham River,
- the opening of entirely new routes by-passing the downtown area,
- the improvement of routes within the CBD itself.

In addition, the accumulation curves obtained from cordon count summaries would be valuable in the continuing review of core area parking requirements.

(b) Traffic Volume Counts

These should be taken on all sections of the major route system within the framework of a regular counting program. Such counts would prove valuable for short-range rescheduling of pavement widenings or intersection improvements; moreover, when timed to follow the completion of specific projects, they could constitute a useful measure of traffic diversion.

If the counting schedule is diligently pursued, hourly, daily, weekly, monthly and seasonal fluctuations in traffic volume could all be recorded, and a perpetually up-to-date, comprehensive flow chart could be maintained.

Finally, such data would be valuable to the Police Department, in that traffic surveillance techniques and assigned manpower could be more realistically adjusted to suit actual conditions.

(c) <u>Intersection Turning Movement Counts</u>

These represent a means of checking demand imposed upon the all-important junctions of major routes. Such counts would also be valuable in establishing both the need for and the priorities of intersection improvements, and would be especially significant when considering turning movement restrictions and changes in traffic control signal timing.

Intersection counts would further contribute to the maintenance of the up-to-date flow chart mentioned earlier: hence, it is most important that these counts also be conducted within the framework of a continuing program.

(d) <u>Route Speed and Delay Surveys</u>

These provide an index of route desirability, particularly in terms of travel time: in addition, a broad spectrum of roadway characteristics may be observed and recorded.

Appendix E represents a summary of route speed and delay surveys undertaken in Wallaceburg during periods of heavy traffic movement. Information is furnished concerning route efficiency, and reasons for delays are stipulated.

Excessive delay invariably represents a significant economic burden imposed upon area motorists. Periodic surveys would help to pinpoint the need for mostly minor improvements; e.g. changes in signal timing or phase coordination, curb parking restrictions, and traffic stream diversions.

4.2.5 THE NEED FOR PUBLIC SUPPORT

The key to the success of the plan, and the only way that ideas and proposals can be transformed into the reality of concrete and steel, is to ensure that all residents of Wallaceburg will lend their support to a campaign of positive action - action which can only contribute to their own benefit, now and in the future.

<u>APPENDICES</u>

F Urban Roadway Characteristics and
Recommended Design Standards

G Recommended Pavement Widths for Major Routes
PART I - Arterial Routes
PART II - Collector Routes

H Intersection Capacities
PART I - Tabulation
PART II - Intersection Capacity Analysis

J Delays at Bascule Bridges and Railroad Crossings

K Central Traffic District Cordon Crossings

L Pedestrian Usage of Centre Bridge

M Parking Characteristics
Simplified Parking Study - Central Traffic District
PART I - Parking Space Inventory by Zone and Type
PART II - Vehicles Parked by Zone and Space Type
PART III - Turnover and Space Usage by Zone
PART IV - Turnover and Space Usage by Space Type
PART V - Peak Parking Hour Space Usage by Zone
PART VI - Peak Parking Hour Space Usage by Space Type
PART VII - Parking Duration by Zone
PART VIII - Parking Duration by Space Type
PART IX - Illegal Parking in Metered Spaces

N Details of Recommended Changes in Curb Parking
Regulations
PART I - Tabulation
PART II - Standards for Curb Parking Prohibition

O Summary of Recommended Changes in Curb Parking
Regulations by Zone
PART I - Number of Spaces Removed and Installed
PART II - Number of Spaces Existing and Proposed

P Glossary

Q Bibliography

D E S T I N A T I O N S

ORIGINS

Zone No.	110	120	130	140	150	210	220	230	240	250	260	270
110					8					61	54	72
120					343					278	140	385
130					9					12	11	9
140					1					38	24	21
150	58	141	9			45	64	57	73	48		
210										26	43	19
220					64					21	43	17
230					57					60	73	71
240					73					78	78	51
250	61	278	32	37	47	76	71	60			51	59
260	54	140	33	24		43	13	73	77	1		
270	73	185	9	39		39	17	71	33	59		
310					22					59	65	60
320					59					21	32	21
330					31					31	44	36
340	6	27	3	4	3	2	4	16	12		1	3
350	40	183	39	39	51	17	38	54	61		41	45
360	5					1	1	3	12	3		
370	96	160	33	23		25	76	67	73	63		
380	45	24	3	3		13	9	7	8	3		
390	27	33	7	6		12	8	39	13	33		
410					48					30	39	27
420					75					51	67	79
430					7					5		3
440	3	5		5	3	5		2				8
450	4						1			3		
460	12	19	3	3			11	7	4	7		
470					9					12	27	11
480												
490												
TOTALS	479	1195	89	169	827	726	309	629	489	1056	852	869
501	109	53	[illegible]	12	33	10	33	26	23	30	33	15
502	131	39	2	16	2	2		41	41	10	15	41
503	661	68	8	2	48	38	46	21	94	87	73	101
504	342	43	17	37	33	40	33	33	140	41	41	46
505	37	16	2	8	20	6	6	10	48	41	10	30
TOTALS	1300	271	35	110	173	96	111	111	299	165	200	227
COMBINED TOTALS	[illegible]	1411	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1241	[illegible]	[illegible]

Zone No.	310	320	330	340	350	360	370	380	390	410	420	430	440	450	460	470	480	490	TOTALS
110				6	48	1	96	33	27				1	1	12				479
120				27	181		160	81	53				5		19				1195
130				5	19		11	3	7						3				89
140				1	14		73	3	8				5		3				169
150	29	59	31	1	54					48	75	7	3			8			827
210				8	17	1	29	11	12				5						776
220				1	12	1	76	9	8					1	37				309
230				11	54	3	67	7	19				2		7				629
240				12	61	12	73	8	43						4				489
250	58	21	36			3	63	3	33	58	53	5		3	7	12			1056
260	85	32	62	4	41					39	67					27			852
270	60	71	36	4	41					27	79	3	8			11			869
310				7	42	4	133	16	29						4				457
320				1	37	4	34	8	17						4				238
330				4	31	4	37	4	16				1	1	5				249
340	7	4	1				9	3	3	4	8				3	1			127
350	42	37	31			4	53		17	16	33				4	4			804
360	4	4	4								4	2							45
370	113	31	37	9	4					63	43	5	5			63			996
380	16	8	3	3						11	8					3			155
390	25	17	16	3	17					70	31		7			3			331
410				4	36		63	11	7						1				269
420				8	31	4	41	8	31				1		18				419
430						3	5												31
440			1				3		7		1				1				47
450			1																9
460	4	4	5	3	4					3	19		1			5			331
470				1	4		15	3	4										129
480																			
490																			
TOTALS	457	238	249	127	804	6	996	155	331	269	419	21	17	9	116	129			11,382 TOTAL INTERNAL TRIPS
501	33	8	33		16		20		20	16	13	3			[illegible]	7			338
502	26	8	15		27		22	2	3	9	12				2	2			400
503	87	32	4	3	104		69		14	41	184				11				1997
504	43	21	41		36		142	41	37	24	14	17			19	62			1425
505	26	12	10	2	12		73	26	[illegible]	24	56				20	8			410
TOTALS	192	131	131		25		354	39	69	131	302	19	[illegible]		58	78			4,626 TOTAL EXTERNAL TRIPS
COMBINED TOTALS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1		1	1	11		11	41	[illegible]	9	173	[illegible]		

Zone No.	Station 501	Station 502	Station 503	Station 504	Station 505	TOTALS	COMBINED TOTALS
110	109	133	661	342	57	1300	1779
120	13	39	68	43	16	271	1117
130	6	2	8	47	2	15	124
140	12	16	37	37	8	110	279
150	23	7	45	79	20	173	997
210	10	2	38	40	6	96	372
220	11	3	55	33	6	111	420
230	26	12	44	33	18	139	562
240	35	11	94	140	18	299	788
250	30	10	87	48	10	165	1241
260	13	35	79	63	30	200	1052
270	35	17	101	16	28	227	1096
310	12	26	87	41	26	192	649
320	8	8	82	21	12	131	369
330	13	15	58	41	30	137	386
340			5		8	5	132
350	16	27	104	36	17	225	1029
360							45
370	28	22	89	182	73	354	1350
380		8		11	26	39	194
390	90	2	11	11		82	411
410	11	9	11	11	24	114	383
420	23	11	107	58	26	232	733
430	2			17		19	50
440	8					8	50
450							9
460	5	2	11	12	25	58	177
470	2	2		8	6	78	207
TOTALS	338	400	1997	1425	410	4,626 TOTAL EXTERNAL TRIPS	
501		[illegible]	68	22	3	171	691
502			[illegible]	381	14	232	642
503	95	41		01	19	684	2681
504	25	311	1		1	682	210
505	3	14	33	1		71	1
TOTALS	161	242	684	683	71	1,840 TOTAL THROUGH TRIPS	
COMBINED TOTALS	1??	143	681	117	541		GRAND TOTAL 22,874

NOTE: INTERNAL, NON-RIVER CROSSING TRIPS NOT INCLUDED. REFER TO APPENDIX C.

INTERNAL AND EXTERNAL

ORIGIN AND DESTINATION SURVEY

AVERAGE WEEKDAY – 1964

WALLACEBURG TRAFFIC PLANNING STUDY

D E S T I N A T I O N S

ZONE NO.	110	120	130	140	150	210	220	230	240	250	260	270	310	320	330	340	350	360	370	380	390	410	420	430	440	450	460	470	480	490	TOTALS	STATION NUMBER 501	502	503	504	505	TOTALS	COMBINED TOTALS
110					58					208	59	60				32	203	23	164	52	63				2	10	30				965	128	165	833	460	70	1660	2625
120					119					708	124	157				101	669	53	190	52	67				7	5	56				2302	57	41	83	52	16	249	2551
130					37					105	35	72				16	130	10	46	16	17						7				451	12	5	23	43	7	90	541
140					10					66	10	25				8	72	8	23	5	13						5				252	10	13	33	36	4	98	350
150	60	119	37	18		16	58	60	81	154			25	64	25	23	202					37	96	37				6	6	3	1110	26	9	82	97	16	220	1330
210					4					77	41	43				11	69	19	36	35	25				3		5				431	10	3	45	40	4	103	534
220					58					61	45	34				7	95	20	100	10	70					3	24				481	13	6	59	40	7	125	606
230					39					147	64	58				22	171	22	18	22	33						6				662	24	31	32	14	17	125	787
240					61					274	63	57				42	235	45	83	63	81				3	7	8				952	51	13	96	161	17	320	1282
250	209	706	105	67	154	18	62	144	22		177	131	104	15	90			120	257	81	193	143	271	87		8	32	24	5		3630	101	30	226	177	30	648	4278
260	19	125	27	16		42	45	64	63	162			59	38	37	29	190					96	93	52				20			1221	12	22	96	85	16	251	1472
270	80	158	73	27		43	39	53	47	191			58	37	33	27	160					94	114	43				8			1255	16	22	133	64	31	272	1527
310					19					104	59	17				14	135	26	103	28	41						7				593	9	25	80	47	25	181	774
320					64					74	38	27				11	112	25	47	45	45						18				506	11	10	103	30	15	173	679
330					35					88	17	33				14	60	23	41	14	32					1	10				398	11	16	56	45	4	117	515
340	32	108	16	8	24	11	7	77	43		29	27	14	11	14			17	48	16	31	21	41	11				1			548	10	7	48	32	1	98	647
350	204	697	131	78	205	89	95	173	236		190	180	135	412	80			110	254	52	147	139	241	74			42	3	6		3674	164	115	544	283	125	1231	4905
360	81	54	10	8		19	20	20	45	100			26	23	23	17	115					37	45	19							573	11	4	48	43	18	128	701
370	164	190	46	23		31	100	79	80	257			104	87	41	48	253					176	69	54				42		5	1818	41	34	125	252	112	570	2368
380	52	52	16	5		13	10	73	61	81			38	45	14	16	52					44	61	1	2			6			609	27	5	30	38	47	167	756
390	64	67	17	13		26	20	33	82	391			41	48	32	31	147					76	93	50				9			1049	48	12	43	102	15	220	1269
410					37					343	96	94				21	159	17	176	44	44				3		10				842	11	48	133	13	47	324	1166
420					96					269	93	114				41	244	45	87	63	58						56				1198	21	20	135	96	38	310	1708
430					37					87	58	43				11	73	10	54	7	50					2	8				434	24	25	80	44	5	186	622
440	2	8				1			1											2		1									19	6		2	2		10	29
450	10	5					2		2	8					1									2							30			2	9	2	13	43
460	36	36	7	9		5	18	6	8	32			7	18	10		46					10	56	9				11			318	15	6	41	58	66	186	504
470					4					24	20	8				5	9		42	6	6						11				137	2	1		78	8	84	221
480					8					3		1																			18	3		8	4		14	32
490					9					3									7												8			5			4	13
TOTALS	909	2314	455	254	1107	434	909	668	668	3564	1218	1849	596	508	400	543	3664	570	1816	609	1044	843	1203	437	18	36	317	135	20		26,446 TOTAL INTERNAL TRIPS	831	683	3484	2502	920	8,377 TOTAL INT/EXT TRIPS	
STATION NO. 501	139	57	13	12	12	12	12	29	31	180	12	12	9	12	12	10	169	12	41	17	37	17	17	24			15		3		879		16	152	37	3	288	1115
502	185	41	5	15	9	2	6	12	15	80	12	12	12	12	16	7	115	9	36	4	12	48	20	26			6	3			684	6			250	29	415	1099
503	838	13	15	33	62	43	69	12	96	295	95	119	60	101	56	60	539	58	129	15	43	119	315	61	2	2	41				3490	1125			618	66	1198	4688
504	463	52	43	18	18	43	40	36	161	177	86	64	42	30	46	36	288	43	259	38	108	36	94	50			35	73			2508	37	250	66		15	1200	1709
505	70	16	7	4	26	4	7	37	12	36	16	12	25	17	9	3	124	19	117	87	15	87	18	9			86				622		24	69	27		124	546
TOTALS	1665	249	90	99	220	104	115	129	320	643	252	271	131	174	135	99	1027	128	370	147	215	325	310	190	10	13	184	86	13	9	8,384 TOTAL EXTERNAL TRIPS	760	415	1127	1201	134	3,203 TOTAL THRU TRIPS	
COMBINED TOTALS	1834	2561	535	351	1327	538	607	793	1288	4207	1110	1520	777	682	535	644	4541	698	2186	754	1863	1168	1711	627	28	49	509	224	13	13		1187	1098	4786	1701	946		GRAND TOTAL 46,412

O R I G I N S

NOTES: ● INTERNAL, NON-RIVER-CROSSING TRIPS NOT INCLUDED. REFER TO APPENDIX C.

● EXPERIENCE INDICATES THAT VIRTUALLY ALL URBAN AREA TRIPS (i.e. TRIPS WITHIN, INTO, OUT OF AND THROUGH AN URBAN AREA) ARE REVERSED (i.e. DIRECTIONALLY BALANCED) ON A 24-HOUR BASIS. FOR CONVENIENT APPLICATION TO TRAFFIC ASSIGNMENT AND OTHER ANALYSES, A PERFECT BALANCE HAS BEEN ASSUMED.

WHEREAS THE 1964 TRIP TABLE (APPENDIX A) IS DEEMED BALANCED, ROW AND COLUMN TOTALS OF THIS 1985 TRIP TABLE ARE SLIGHTLY OUT OF BALANCE IN SOME INSTANCES. THIS IS DUE TO THE SUCCESSIVE ADDITIONS AND ROUNDINGS TO WHICH INDIVIDUAL CELL VALUES AND ROW AND COLUMN TOTALS ARE SUBJECTED, DURING THE COURSE OF THE TRIP EXPANSION (ITERATION) PROCESS.

WALLACEBURG
TRAFFIC PLANNING STUDY

PROJECTED

INTERNAL AND EXTERNAL TRIPS

AVERAGE WEEKDAY — 1985

LAND USE AND TRAVEL PROJECTION

PART I PROJECTED CHANGES(1) IN:
- RESIDENTIAL POPULATION,
- COMMERCIAL/RETAIL FLOOR SPACE(2),
- INDUSTRIAL EMPLOYMENT,

INTERNAL ORIGIN AND DESTINATION ZONES(3)

Internal O-D Zone Number	Residential Population			Commercial/Retail Floor Space (x 1,000 sq.ft.)			Industrial Employment		
	1964	Projected 1985	F_r	1964	Projected 1985	F_{cr}	1964	Projected 1985	F_i
110	100	40	0.40	58.1	81.2	1.40	-	-	-
120	68	36	0.53	144.4	175.0	1.21	-	-	-
130	98	480	4.90	4.3	8.0	1.86	-	-	-
140	36	8	0.22	31.3	34.0	1.09	-	-	-
150	117	16	0.14	72.0	86.5	1.20	-	-	-
210	454	504	1.11	5.2	9.0	1.73	8	0	0
220	371	440	1.19	40.3	45.5	1.13	-	-	-
230	361	400	1.11	23.9	25.5	1.07	-	-	-
240	1,261	1,600	1.27	-	-	-	-	-	-
250	707	2,200	3.12	8.4	10.5	1.25	29	0	0
260	859	1,000	1.17	6.1	5.0	0.84	34	5	0.15
270	919	1,200	1.31	25.0	25.0	1.00	37	0	0
310	52	0	0	-	-	-	1,157	1,200	1.04
320	852	1,080	1.27	-	-	-	12	0	0
330	792	864	1.09	-	-	-	-	-	-
340	182	704	3.87	-	-	-	-	-	-
350	481	2,000	4.16	4.0	5.5	1.38	-	-	-
360	56	600	10.70	-	-	-	-	-	-
370	1,358	2,000	1.47	2.5	2.5	1.00	55	20	0.36
380	12	0	0	5.8	8.5	1.47	0	500	N/A
390	21	0	0	-	-	-	348	1,000	2.88
410	291	0	0	-	-	-	400	1,500	3.75
420	831	1,832	2.20	-	-	-	-	-	-
430	136	800	5.88	-	-	-	-	-	-
440	0	40	N/A	-	-	-	-	-	-
450	13	40	3.08	-	-	-	-	-	-
460	43	60	1.39	-	-	-	24	300	12.50
470	-	-	-	-	-	-	105	120	1.14
480	27	40	1.48	-	-	-	-	-	-
490	11	16	1.45	-	-	-	-	-	-
TOTALS	10,509	18,000	1.71	431.3	521.7	1.22	2,209	4,645	2.10

PART II CURRENT AND PROJECTED TRIP GENERATION(4),
based upon GENERATION FACTORS DEVELOPED FOR:
- AVERAGE WEEKDAY "WORK" TRIPS,
- AVERAGE WEEKDAY "COMMERCIAL" TRIPS,
- AVERAGE WEEKDAY "OTHER" TRIPS,

INTERNAL ORIGIN AND DESTINATION ZONES and EXTERNAL ORIGIN AND DESTINATION STATIONS

O-D Zone or Station Number	Purpose: "WORK"			Purpose: "COMMERCIAL"			Purpose: "OTHER"			TOTALS(5)		
	Surveyed 1964	Projected 1985	Trip Factor F_W	Surveyed 1964	Projected 1985	Trip Factor F_C	Surveyed 1964	Projected 1985	Trip Factor F_O	Surveyed 1964	Projected 1985	Trip Factor F_T
ZONES: (Trips From/To each Internal O-D Zone To/From all other zones and External O-D Stations)												
110	686	977	1.43	708	1,063	1.50	385	590	1.53	1,779	2,630	1.48
120	412	922	2.24	781	1,279	1.64	223	356	1.60	1,416	2,557	1.81
130 (6)	40	191	4.78	64	239	3.73	20	113	5.64	124	543	4.38
140	129	146	1.13	116	162	1.40	34	44	1.31	279	352	1.27
150	457	543	1.19	393	594	1.51	147	192	1.31	997	1,329	1.34
210	146	191	1.31	73	185	2.54	103	160	1.55	322	536	1.56
220	210	277	1.32	130	203	1.56	80	127	1.59	420	607	1.45
230	165	208	1.26	284	415	1.46	113	167	1.48	562	790	1.41
240	297	439	1.48	139	240	1.73	352	606	1.72	788	1,285	1.63
250 (6)	493	1,527	3.10	406	1,418	3.48	342	1,273	3.72	1,241	4,218	3.40
260	478	598	1.25	322	479	1.49	252	394	1.57	1,052	1,471	1.40
270	444	592	1.34	356	575	1.62	296	357	1.20	1,096	1,524	1.39
310	542	642	1.19	75	98	1.31	32	36	1.13	649	776	1.19
320	145	302	2.08	95	151	1.59	129	228	1.77	369	681	1.85
330	143	180	1.26	88	130	1.48	155	227	1.47	386	537	1.39
340 (6)	41	183	4.46	43	218	5.08	48	245	5.11	132	646	4.88
350 (6)(7)	400	1,648	4.12	340	1,518	4.46	339	1,732	5.12	1,079	4,898	4.53
360 (6)	17	208	12.28	1	100	100.00	27	392	14.50	45	700	15.55
370	700	1,091	1.56	381	771	2.03	269	525	1.95	1,350	2,387	1.77
380 (6)	122	556	4.56	44	122	2.78	28	78	2.78	194	756	3.89
390 (6)	313	935	2.99	73	252	3.45	27	79	2.92	413	1,266	3.07
410 (6)	298	948	3.18	45	155	3.45	40	64	1.60	383	1,167	3.05
420	367	691	1.89	227	673	2.97	117	347	2.97	711	1,711	2.40
430 (6)	12	230	19.15	6	166	27.70	22	229	10.42	40	625	15.62
440 (6)(7)	0	13	N/A	0	10	N/A	0	11	N/A	0	34	N/A
450 (6)	5	17	3.40	4	16	4.00	0	10	N/A	9	43	4.78
460 (6)	101	293	2.90	52	142	2.73	19	69	3.63	172	504	2.93
470	188	207	1.10	9	11	1.22	3	5	1.67	200	223	1.12
480 (6)	0	14	N/A	0	9	N/A	0	10	N/A	0	33	N/A
490 (6)	0	5	N/A	0	4	N/A	0	4	N/A	0	13	N/A
TOTALS	7,351	14,774	2.01	5,255	11,398	2.17	3,602	8,670	2.41	16,208	34,842	2.15
STATIONS: (Trips From/To each External O-D Station to all Internal O-D Zones) (8)												
501 (Hwy.78)	236	389	1.65	182	300	1.65	116	191	1.65	534	880	1.65
502 (Kent Cty Rd.31)	164	281	1.71	140	239	1.71	96	164	1.71	400	684	1.71
503 (Hwy 40-west)	851	1,484	1.75	532	932	1.75	614	1,074	1.75	1,997	3,490	1.75
504 (Hwy.40-south)	769	1,353	1.76	291	512	1.76	365	641	1.76	1,425	2,506	1.76
505 (Kent Cty Rd.15)	262	458	1.75	116	203	1.75	92	161	1.75	470	822	1.75
TOTALS	2,282	3,965	1.74	1,261	2,186	1.74	1,283	2,231	1.74	4,826	8,382	1.74
GRAND TOTALS (EXCLUDING THROUGH TRIPS)	9,633	18,739	1.95	6,516	13,584	2.08	4,885	10,901	2.23	21,034	43,224	2.06

PART III THROUGH TRIP PROJECTION

External O-D Station	AVERAGE WEEKDAY THROUGH TRIPS(9)		
	Surveyed 1964	Through Trip Factor(10)	Projected 1985
501 (Hwy. 78)	161	1.65	266
502 (Kent Cty. Rd. 31)	242	1.71	415
503 (Hwy. 40-west)	684	1.75	1,197
504 (Hwy. 40-south)	682	1.76	1,201
505 (Kent Cty. Rd. 15)	71	1.75	124
TOTALS	1,840	1.74	3,203

C. PART IV - NOTES REFERRING TO TABULATIONS (Parts I, II and III)

(1) Current data and projections were obtained from an annotated brief prepared by Alan Crossley, M.R.A.I.C., M.T.P.I.C., Planning Consultant to the Town of Wallaceburg. The projections and supporting text, were subsequently accepted by the Province of Ontario, and by the Consultant as adequate base data for the Traffic Planning Study analysis.

(2) Only principal commercial areas are specified. Admittedly, small groups of retail outlets and occasional isolated stores currently exist (and will surely continue to exist) within predominantly residential areas; however, such establishments have not been considered in the analysis because of the relatively insignificant effects they exert upon area-wide traffic generation.

The figures represent only merchandising space and office space. Those warehousing and storage functions commonly considered commercial in nature are not included, since traffic volumes generated by such land uses are negligible.

(3) Refer to Exhibit 2.A: "Street Map Showing Origin and Destination Zones", stored in a pocket inside the rear cover of this report.

(4) All trips theoretically taking place within, into, out of, and through the study area are represented, EXCEPT INTERNAL, NON-RIVER-CROSSING TRIPS. These could not be included in trip tables (Appendices A and B) because of the limited number of O-D stations operated for the Internal Origin and Destination Survey (refer also to Appendix C, Part VI).

(5) These figures were not used for expanding traffic flows to 1985 levels: each of the three trip tables based upon trip purpose was iterated separately to obtain 1985 trips, and the results were then combined to represent area-wide, all-purpose traffic movement (excluding INTERNAL, NON-RIVER-CROSSING TRAFFIC) for an average weekday in 1985.

Totals are included here only so that rough comparisons may be drawn between overall current and projected traffic generation, on a zone-by-zone basis.

(6) Projected 1985 traffic generation levels within these zones were obtained by means of a land use model. Land uses in these zones are expected to undergo either fundamental changes or gross intensifications during the study period, and any expansion factor greater than 3.00 would lead to serious distortions in the function and output of the standard computer iteration program used by the Department of Highways.

(7) 1964 trips apparently generated by Zones 350 and 440 have been combined. Zone 440 seems to be totally undeveloped in 1964, and yet survey results indicated that several trips were being generated therein (see Appendix A): it is assumed such trip reports resulted from erroneous interviewee response, lack of clarity in zone boundary definition, etc. For trip expansion purposes, therefore, the 1964 trip total in Zone 440 becomes zero, and reported Zone 440 trips become additive to those reported for the adjacent Zone 350.

(8) These represent internal/external and external/internal trips only. Refer also to Appendix C, Part III, and to Note (9) immediately following.

(9) Through trip expansion is not based upon trip purpose as such, whereas trip purpose is highly significant in urban area travel (i.e. travel within, into and out of an urban area). Hence, all through trips were iterated separately, and the expanded (1985) movements were then included with the 1985, internal, internal/external and external/internal trips obtained by three-part iteration based upon trip purpose.

Appendix C, Part III, gives through trips in one direction only. Experience has shown that trips within, into, out of and through an urban area are very nearly balanced, directionally, on a 24-hour basis; thus, total (two-directional) through movements are assumed to be double the values given.

(10) These "station factors" were obtained from the Department of Highways in connection with the South-Western Ontario Regional Traffic Study. These data were discussed with Department officials, and were authorized for use in the Wallaceburg Traffic Planning Study analysis.

PART V - CENTROIDS

For analysis purposes, all traffic-generating activity within an O-D zone is assumed to be concentrated at its centroid of development. The position of the centroid is usually adjusted slightly, so that it will coincide with an intersection on at least one major street.

For convenience, external O-D survey stations are also considered as centroids. In the typical urban transportation study, the boundary of the analysis is the external O-D cordon, and external cordon stations appear as points which generate through, internal/external and external/internal traffic; i.e. functionally, they become centroids, and may be treated as such within the context of the analysis.

PART VI - INTERNAL, NON-RIVER-CROSSING TRIPS

Appendix A indicates:

- all 1964 average weekday river-crossing trips taking place wholly within the study area (i.e. internal, river-crossing trips),
- all trips passing entirely through the study area, and
- all trips either entering or leaving the study area, whether they crossed the Sydenham River or not.

Internal, non-river-crossing trips were not accounted for by either internal or external O-D surveys, but may be analyzed by studying the traffic volume flow charts, (Exhibits 2.C and 2.D), in conjunction with O-D survey results. Major route traffic volumes resulting from ATR and intersection turning movement counts were invariably found to be higher than those indicated by the assignment of volumes resulting from the O-D surveys. The discrepancies represented internal, non-river-crossing trips, including neighbourhood and "circulating" trips; the latter being especially common in the CBD. The volume difference between recorded and

assigned 1964 volumes was then projected to 1985 levels, on the basis of anticipated development (i.e. growth in: population, commercial activity, industrial employment and motor vehicle usage) within individual O-D zones, and within the urban area generally.

In this way, intra-zonal traffic activity could be analyzed, and a realistic appraisal of future area-wide traffic movement could be made. Refer also to Section 3, subsection 3.2: "1985 TRAFFIC ASSIGNMENT".

PART VII - TRAFFIC EXPANSION, SIMULATED TRAFFIC AND THE MODULAR TRIP TABLE

Simulated traffic is that (generated) traffic which must be calculated for an Origin/Destination zone or other traffic generator for which current traffic generation characteristics are either unclear, unobtainable, incomplete, or otherwise inapplicable, within the context of a traffic study.

For example: where a reasonable level of development exists within an O-D zone at the time of the traffic survey, and no drastic alteration in land use is envisioned during the study period, a traffic expansion factor can be calculated to reflect both the intensification and/or spread of land development over that period. This factor can be adjusted to account for increased ownership and usage of motor vehicles.

However, a number of areas (i.e. O-D zones) commonly exhibit either marked intensification of land use, or complete change in land use (.e.g. "agricultural" to "residential"; "residential" to "industrial"; etc.). Special study must be afforded such zones, and future trip distributions may only be calculated using traffic simulation procedures.

Average traffic generation factors may be calculated for all-residential, commercial and industrial areas (i.e. O-D zones) to denote respectively:

- trips generated by 100 residents,
- trips generated by 1,000 square feet of commercial/retail floor space, and
- trips generated by 100 industrial employees.

After adjusting the factors to reflect prospective increases in motor vehicle ownership and usage, they can be used to obtain "target year" (e.g. 1985, for

the Wallaceburg study) control trip totals for the O-D zones, external O-D stations and other generators encompassed by the study at hand.

After all control totals were obtained, the simulated "base year" (e.g. 1964 for the Wallaceburg study) trip totals for the atypical O-D zones discussed above were calculated by applying the reciprocal of the average trip expansion factor for the entire study area to each "target year" atypical zone trip control total.

The average trip expansion factor for the study area was obtained thus:

$$F_{avg.} = \frac{\text{Total of "target year" control trip totals for all TYPICAL zones}}{\text{Total of "base year" trip totals, resulting from Origin/Destination Survey, for all TYPICAL zones}}$$

Thus, for each atypical zone, an artificial modular "base year" trip total was obtained: i.e. a simulated total.

The input for the Traffic Forecasting and Balancing program* consists of a trip table, made up of one-way trips (i.e. a "directional" trip table), and containing:

- actual "base year" trip interchanges from/to each TYPICAL zone or station, to/from all other TYPICAL zones or stations,
- simulated "base year" trip interchanges for each zone and/or station pair, of which at least one member is ATYPICAL,
- projected "target year" trip control totals for all TYPICAL and ATYPICAL zones and stations, based upon traffic generation factors.

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* This iterative program is used to obtain a logical and mathematically coherent trip distribution pattern for specified "target years". It utilizes "base year" trip distributions and projected zonal and external station trip totals (i.e. "target year" control totals) as input, interating the former to approach the latter. The program was developed by the Traffic Engineering and Data Processing Sections of the Ontario Department of Highways, for use with the I.B.M. "7040" computer.

This, then, represents a <u>modular trip table</u>, in contrast with an actual "base year" trip table (see Appendix A), which results from the Origin/Destination survey.

In the case of Wallaceburg, three separate and distinct <u>modular trip tables</u>, based upon vehicle trip purpose, were used in the traffic expansion analysis:

- Table No. 1 contained WORK trips; i.e. trips made for the purpose of going to or coming from one's place of employment,

- Table No. 2 contained trips broadly classified as COMMERCIAL in nature; i.e. trips made for the purposes of:

    - transacting business (e.g. paying bills, visiting bank, etc.),
    - visiting a doctor's or dentist's office,
    - shopping (including eating in a restaurant, visiting a barber shop or a beauty parlour, etc.).

- Table No. 3 contained all OTHER trips not included in Tables No. 1 and 2; i.e. trips made for the purposes of:

    - going to or coming from school (excepting trips to or from school made by teachers, since these would constitute WORK trips),
    - engaging in social and recreational pursuits,
    - changing travel mode (e.g. taking a taxi from a railroad station to an airport),
    - miscellaneous reasons (<u>specified</u> on interview forms).

These tables, each containing cells for all O-D zones and stations, were iterated individually to separate sets of 1985 control totals, thus resulting in traffic projections based upon <u>multiple parameters</u>.

The three tables mentioned above contained only internal, internal/external, and external/internal trips. <u>Through trips</u> were iterated separately, since land use and trip purpose at origin or destination did not have to be considered: expansion factors for external traffic (i.e. "station factors") were derived by the Ontario Department of Highways within the context of the South-Western Ontario Regional Traffic Study.

These factors were accepted as the basis upon which to expand through trips. After individual tabular iteration, the four 1985 (expanded) trip tables were combined to form a complete all-trip* 1985 trip table, used subsequently for analyses such as traffic assignment, and improvement program development.

PART VIII - TRAFFIC ASSIGNMENT AND THE MINIMUM TIME PATH

Traffic (volume) assignment denotes the loading of a given pattern of travel desires (i.e. traffic volumes) upon a partial or complete route network, an individual route or a group (i.e. corridor) of routes.

The "All or Nothing" assignment program is commonly used for traffic planning studies in Ontario. This, in turn, is founded upon the "Minimum Time Path" program, applied to a given route network. The M.T.P. program, based upon route speed and delay surveys, or level of service speeds established for the various route classifications, defines minimum travel times from/to each origin/destination zone or station to/from all other O-D zones and stations in the study area. The "All or Nothing" assignment program then simply assigns all trips to the fastest routes**.

At first thought, this may appear highly illogical and inaccurate, but experience has shown that drivers' preferences(i.e. for particular routes), and other intangible considerations will be compensated for: in other words, while choice of route does not depend solely upon elapsed travel time, admittedly this will be the primary criterion by which the usefulness of, and hence the demand imposed upon a route are gauged. Most surveys indicate that the route which can be covered in

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* As explained in Appendix C, Parts II (note (4)), and VI, Internal, Non-River-Crossing Trips do not appear in either the 1964 trip table (Appendix A) or the 1985 trip table (Appendix B).

** A "Minimum Distance Path" program is also available. This is similar in format to the "Minimum Time Path" program, differing only in that travel time becomes a constant, non-operative factor. The M.D.P. program is often used in forming composite desire line matrices.

the shortest total time will be chosen by the overwhelming majority of those who are familiar not only with the route in question, but also with alternative routes. This usage characteristic prevails even where an alternative route is shorter (i.e. in overall length): therefore, the "All or Nothing" technique may be accepted as being self-compensating and statistically accurate.

PART IX - MOMENT ANALYSIS*

The same principles used in the determination of neutral axes and centroids of physical bodies are also applicable to O-D data plotted on scale maps, showing amounts and zones of traffic generation. This type of analysis may be used to show the optimum location of a common terminal, or a straight-line route of a given bearing.

It may also be used in locating the optimum site of a bridge crossing. This was done during the course of the Wallaceburg Traffic Planning Study, based upon the premise that the Lord Selkirk Bridge did not exist.

Centroids of all O-D zones and zone groups were plotted on a chart, and were joined by trans-river desire lines, so that all zone and station centroids on one side of the Sydenham River were joined to all centroids on the other side. All interzonal and interstation trans-river traffic volumes were listed.

Since all traffic would cross the river at one point (i.e. the optimum point), the straight line which most closely followed the course of the river became an axis, and was used as a reference line. The point at which each desire line crossed this axis represented the ideal river-crossing location for the particular volume.

In the case of Wallaceburg, it was found that the optimum location for a single bridge across the main channel of the Sydenham River was approximately 600 feet east (i.e. upstream) of the Lord Selkirk bridge. This was the result, using average weekday 1964 volumes and

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* Excerpts from "Analysis by Method of Moments"; pt. Chapter 6, "Traffic Engineering", by Matson, Smith and Hurd. Discussion suitably modified to complement Wallaceburg Traffic Planning Study.

centroid locations: when the moment analysis was redone using projected 1985 data, the optimum position changed very little, moving only 200 feet further east (i.e. upstream).

Hence, it may be concluded that, theoretically, the Lord Selkirk Bridge is almost ideally situated - as an unique crossing of the Sydenham River - as far as both current and projected conditions are concerned. Unfortunately, its capacity has already been reached, and an additional crossing must soon be provided. In addition, a single crossing point becomes quite inconvenient for those whose trips originate and/or terminate some distance away from that point.

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In practice, the pattern of the street and road network, the traffic conditions on this network, and other considerations frequently modify the application of the method of moments in analyzing O-D data for a river crossing problem. For example: if road and traffic conditions along the river banks are identical for all practical purposes, it is of little consequence where the bridge is located, <u>as far as trips with a diagonal orientation are concerned</u>. In such a case, diagonal movements should not be considered, and only those traffic streams which would form a "U", "J" or hook-shaped pattern should be analyzed.

The Wallaceburg urban area is so laid out that several trans-river desire lines make an extremely acute angle with the line chosen as the moment axis. This is due to two factors:

(a) The meandering course of the Sydenham River, with its lengthy reverse curve to the south-west,

(b) the position of certain zones - characterized by high traffic generation - at the extremities of the urban area (e.g. the large industrial areas situated in the south-western corner of the Town).

It was thus possible to ignore certain diagonal traffic movements in the case of Wallaceburg. However, roads along the river banks were <u>not</u> always "equal", as far as speed and overall convenience were concerned, and

hence, travel desires represented by most diagonal movements ultimately had to be considered.

PART X - ROUTE CAPACITY CALCULATION

As urban street capacity is basically a function of the capacity of intersections with other major routes, all capacities assumed in this report are based upon certain assumptions concerning the operation of these intersections. These assumptions are as follows:

1. No bus stops and curb parking prohibited,

2. Turning movements amount to 20% of total approach volume,

3. Commercial vehicles do not exceed 10% of approach volume,

4. Fixed time traffic control signals with 50% green time,

5. Peak hour (design hour) percentage

   (a) 10% of total volume on two-way streets
   (b) 12% of total volume on one-way streets,

6. Direction split on two-way streets 60%-40%,

7. Practical capacities of streets in various areas:

STREET TYPE	AREA	VEHICLES PER 11-FT. LANE PER HOUR OF GREEN
Two-Way Arterial	Intermediate	950
Two-Way Arterial	Downtown	700
One-Way Arterial	Intermediate	1040
One-Way Arterial	Downtown	900

Based upon these assumptions for the Wallaceburg area during 1985, the daily route capacities are as follows:

TYPE OF AREA	NO. OF TRAFFIC LANES					
	2 LANES		4 LANES		6 LANES	
	Two Way	One Way	Two Way	One Way	Two Way	One Way
Inter-mediate	8,000	8,400	15,800	16,600	23,800	-
Downtown	5,800	7,200	11,700	14,400	17,500	-

GROUPING
OF
INTERNAL ORIGIN AND DESTINATION ZONES
AND
EXTERNAL ORIGIN AND DESTINATION STATIONS

The following O-D zone and station groups were devised in order to simplify trip interchange patterns for desire line charts. In addition to spatial considerations, land use consistency was an important factor in constituting groups of internal O-D zones.

Exhibit 3.C: "1964 Trans-River Travel Desires", and
Exhibit 3.D: "Projected 1985 Trans-River Travel Desiree"

are formulated on the basis of O-D zone and station groups. Group designations given below correspond to those shown on Exhibits 3.C and 3.D.

GROUP DESIGNATION	O-D ZONES or STATIONS	PREDOMINENT LAND USE	REMARKS
1	110 120 130 140	Commercial	Central business district of Town, and adjacent residential "fringe"; north of Sydenham River
2	150	Commercial	Central business district; portion south of Sydenham River
3	270	Residential	Relatively isolated residential zone, adjacent to industrial and commercial areas
4	210 220 230 320	Residential	Zones of similar character containing older houses, as well as several retail/commercial establishments. The latter represent the residue of "highway strip commercial" development
5	240 330 430	Residential	Most populous concentration of residential development in Town. Many substantial, well-maintained homes
6	250 340 350 440	Residential	North-eastern residential portion of Town; a "natural group", bounded by the North and East Branches of the Sydenham River, and by the N. and E. Town Limit. Very large potential for residential growth; i.e. for population expansion. Zones 340 and 440 are sparsely developed at present
7	260 360 370 450	Residential	South-eastern residential portion of Town. Large potential for additional residential development. Zones 360 and 460 are sparsely developed at present
8	380 390 460	Industrial	Major industrial area of Town; portion east (i.e. south) of Sydenham River. Large potential for further industrial development
9	310 410 470 480 490	Industrial	Major industrial area of Town; portion west (i.e. north) of Sydenham River. Large potential for further industrial development
10	420	Residential	Major new residential area on westerly edge of urban area. Large potential for residential growth; i.e. for population expansion
A	Station 501 (Hwy.78) Station 502 (Kent Cty.Rd.31)	-	The east, the north and the north-east: Dresden, Thamesville and Hwy.401; Sarnia, Petrolia and Hwy.7
B	Station 503 (Hwy.40-west)	-	Major Hwy.40 through movement likely to by-pass the Town on new high-level bridge on the south-west side of urban area (i.e. Hwy.40 relocation; "Blue Water Parkway"). The west and the north: Sarnia, the Blue Water Bridge, and ferry connections with Michigan, U.S.A.
C	Station 504 (Hwy.40-south) Station 505 (Kent Cty.Rd.15)	-	See remarks immediately above, concerning proposed Hwy. 40 relocation The south, south-east and south-west: Dresden, Thamesville and Hwy.401 (also, alternative to Hwy.78, south of Sydenham River, by-passing Dresden and Thamesville); Chatham, Windsor, Detroit and the west.

APPENDIX E

WALLACEBURG TRAFFIC PLANNING STUDY

SPEED AND DELAY SURVEY
and
COMMENTS REGARDING MAJOR ROUTES

Note: These data are intended to supplement Exhibit 2.E "PEAK PERIOD TRAVEL TIMES AND ROUTE SPEEDS", included and discussed in subsection 2.2.4 of this report.

INDEX

E.1 ARTERIAL ROUTES

E.1.1 Highway 40 (McNaughton and Dufferin Avenues)

South Town Limit to West Town Limit

Operating Speed Range: 7 to 38 m.p.h.

- Major provincial highway route serving Town.

- Typical 2-lane rural highway cross-section at south end; very flat topography. Visibility good.

- Paved area limits not well defined at Base Line (County Road 15) intersection. Many heavy trucks use Base Line to gain access to industrial area. Pavement widening and curbing required in vicinity of intersection.

- Murray/McNaughton intersection sharply skewed. Visibility and other operating conditions quite favourable for those following major route, but southbound drivers on Murray Street must observe extreme caution when entering Highway 40. Intersection improvement required, involving channelization to allow Murray Street to intersect McNaughton Avenue at angle close to 90 degrees.

- Visibility good at C. & O. crossing. Warning signals in operation.

- Heavy left turn movement southbound to eastbound at Wallace Street. When part-time left-turn prohibitions are in effect at Wallace/McNaughton, Gillard/McNaughton intersection accommodates all left turns. McNaughton Avenue pavement not wide enough to provide adequate clearance for passing left-turning vehicles either at Wallace or Gillard Streets. Problem accentuated whenever heavy trucks involved: hence, considerable delay and frequent accidents ensue. Corner cut-backs at two intersections in question, and overall pavement widening required.

- Motorists unable to see across Lord Selkirk Bridge due to steeply graded approaches; hence, many rear-end collisions occur on or near both approaches. Problem intensified at Wallace/McNaughton due to left-turn movements and inability to pass, described above. At north approach, northbound to westbound

left turns into James Street and northbound to east-bound right turns into James Street cause general traffic stream slowdown, thus adding to risk of rear-end collisions. Right turn movement requires extremely sharp turn: manoeuvre particularly difficult for large trucks. Pavement widening, intersection corner cut-backs and additional traffic control required on both bridge approaches.

- Dufferin/Lisgar/McNaughton intersection represents confluence of heaviest traffic volumes in Town. Signal and turning delays quite frequent. Intersection redesign and signal cycle modification required.

- Dufferin Avenue quite wide between Lisgar and Forhan Streets, but unlimited curb parking is permitted both sides. Hence, only two moving traffic lanes are available.

- Badly aligned intersection approach at Johnston Street south of Dufferin Avenue. Skew restricts visibility, and considerable delay results. Accident frequency high.

- Curb parking permitted too close to Forhan/Dufferin intersection: hence, only one lane can approach intersection, and straight-through movement is often delayed by left-turning vehicles (usually large trucks). View of traffic signals frequently obscured by large trucks. Many rear-end and broad-side collisions occur here.

- Pavement narrows suddenly, west of Forhan Street. Becomes rough 2-lane pavement with gravel shoulders.

- Roadway lighting ends at C. & O. crossing.

- C. & O. crossing badly skewed, but visibility adequate: crossing protected by warning signals. Train delay infrequent.

- Typical 2-lane rural highway cross-section west of C. & O. crossing. Left turns into residential streets cause some delay, although many drivers pass turning vehicles on right shoulder. Visibility very good, and accident frequency is low.

E.1.2 Highway 78 (Margaret Avenue, Fork, Wellington, Lisgar and James Streets)

East Town Limit to Dufferin/Lisgar/ McNaughton Intersection*

Operating Speed Range: 4 to 32 m.p.h.

- Provincial highway connecting Wallaceburg with Dresden, Thamesville and Highway 401 (MacDonald-Cartier Freeway).

- Typical 2-lane rural highway cross-section east of Sydenham District Hospital. Visibility excellent. Curves gentle.

- Intersection at River Road quite similar to Murray/McNaughton intersection discussed in subsection E.1.1: similar channelization required.

- Roadway allowance narrows suddenly west of Dundas Street. Margaret Avenue pavement surface rough.

- Visibility adequate over Dundas Bridge.

- Westbound traffic must make very sharp right turn north into Fork Street. Manoeuvre particularly difficult for large trucks.

- Additional sharp (left) turn at Fork/Wellington. Visibility only fair here, due to lack of building set-back in north-east quadrant of intersection (i.e. jog introduced into northbound Fork-Lafontaine movement).

- Wellington Street pavement not uniform in width. Sudden narrowing could cause accidents. Visibility along Wellington Street adequate, however.

- Severe congestion on Lisgar Street between Wellington and James Streets. Congestion was even more severe before block was designated one-way southbound. Block length too short to provide adequate

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* sequence of description: Margaret Avenue, Fork and Wellington Streets westbound, and Lisgar Street southbound to Dufferin/Lisgar/McNaughton intersection; thence eastbound on James Street to Dundas Bridge.

traffic storage area, and to allow for traffic stream segregation. Additional turning lanes and intersection redesign required (see also sub-section E.1.1 regarding Dufferin/Lisgar/McNaughton intersection).

- James/Dufferin intersection sharply skewed. Effect of this is not too serious as both streets operate one way eastbound, but some physical modifications are required to create proper merging section.

- James Street is typical commercial/institutional "main street". Almost continuous curb parking on both sides, frequent parking/unparking manoeuvres, frequent double parking, jay-walking, lack of consistency in driving habits observed (i.e. sudden changing of lanes to make turns or gain access to vacated parking stalls), confusing maze of store signs and red and green suspended pennants which obscure Duncan Street signal. All these contribute to delay and high accident frequency.

- Negligible vehicular flow on Duncan Street (compared with situation prior to closure of Centre Bridge) means intersection no longer satisfied volumetric warrants for signal installation. However, signal still very important for pedestrians (e.g. properly positioned "walk-don't walk" heads would be most helpful).

- Though channelized left turn at Fork/James intersection is somewhat restrictive in clearance and curvature, it does help to achieve reasonable traffic stream segregation on Fork Street.

E.1.3 Base Line

East Town Limit to Wallace Street

Operating Speed Range: 15 to 30 m.p.h.

- Kent County Road 15 connecting Wallaceburg with Tupperville and Dresden.

- 2-lane rural cross-section, paved east of Highway 40, gravel-surfaced between Highway 40 and Wallace Street.

- No roadway lighting.

- Visibility very good, except at Wallace Street intersection. Wallace Street is curving in this vicinity, and intersection is not defined by curbing or pavement markings. No roadway widening has been carried out. Frequent turning movements by heavy trucks cause delay, and are potentially hazardous due to restricted visibility.

- Intersection improvement and adequate roadway lighting required.

E.1.4 <u>Forhan Street</u>

North Town Limit (Third Concession)
to Libby Street

Operating Speed Range: 9 to 32 m.p.h.

- Principal route serving west half of Town's industrial area. The only continuous north/south route in west section of Town.

- Gravel-surfaced north of bridge over Running Creek. No roadway lighting. Typical rural township road cross-section.

- Visibility restricted over bridge.

- Forhan Street quite narrow north of Dufferin Avenue. Additional width required near Elgin Street intersection. Latter recently widened, and turning movements often cause delays on Forhan Street.

- Dufferin/Forhan intersection improvement required. Visibility inadequate, many heavy trucks turn at this point, signals often obscured by large vehicles turning, and accident frequency high (see also subsection E.1.1).

- C. & O. crossing skewed, but visibility adequate. Crossing protected by warning signals.

- Few intersections south of C. & O. crossing; thus little traffic flow turbulence observed, due to minimal "side friction".

- Few sources of delay noted.

E.1.5 Libby Street

Forhan Street to west Town Limit

Operating Speed Range: 27 to 32 m.p.h.

- Typical rural township road cross-section. No roadway lighting.
- Poor surface: combination of gravel sections and rough surface-treatment (i.e. most elementary type of hard surface).
- Very low traffic volumes observed.
- C. & O. industrial siding crosses Libby Street at grade. No warning signals provided, but rail movements are rather infrequent, and visibility is very good.
- No major sources of delay noted.

E.1.6 Third Concession

Nelson Street to west Town Limit

Operating Speed Range: 25 to 35 m.p.h.

- Typical rural township road cross-section. No roadway lighting.
- Gravel surface.
- Very low traffic volumes observed.
- Visibility quite good, except at Nelson Street. Latter is curving in this vicinity, and visibility to the south, over Running Creek bridge, is somewhat restricted.
- No major sources of delay noted.

E.2 COLLECTOR ROUTES

E.2.1 Albert Street

King Street to Base Line (Kent County Road No. 15)

Operating Speed Range: 15 to 28 m.p.h.

- Serves partially developed residential area.
- Relatively narrow. Some rough paving, some gravel-surfaced sections.
- Low traffic volumes observed.
- C. & O. crossing not protected by warning signals, but rail movements are rather infrequent, and visibility is very good.
- No major sources of delay noted.

E.2.2 Elgin Street

Lafontaine Street to Dauw Avenue

Operating Speed Range: 13 to 27 m.p.h.

- Serves older, well developed residential area, and several schools.
- 2 lanes paved east of Lisgar Street, but earth and gravel shoulders are commonly used for parking; hence, two-way traffic flow not impeded.
- Visibility somewhat restricted at jogged Lisgar/ Elgin intersection: some delay occurs. This could be hazardous, as many elementary and secondary school students cross here regularly.
- Pavement recently widened between Lisgar and Forhan Streets. Curb parking permitted both sides, but two-lane two-way traffic can still be accommodated.
- Delay at Forhan/Elgin intersection, due to turning movements, not serious (see also subsection E.1.4).
- Pavement narrow and fairly rough west of Forhan Street, route not officially open between Francis Avenue and First Street.

- West end of Elgin Street is presently a "dead end": serves residential subdivision.

E.2.3 James Street (west of McNaughton Avenue)

Oak Street to McNaughton Avenue

Operating Speed Range: 9 to 20 m.p.h.

- Principal connection between Dominion Glass Company Ltd. installations, CBD, and Highways 40 south (Lord Selkirk Bridge) and 78.

- Narrow pavement, fair condition.

- Very restricted visibility on all approaches to James/Oak intersection due to minimal set-back established for house in north-east quadrant. Problem accentuated because many heavy trucks and transports turn here.

- Although James Street pavement is narrow, curb parking is permitted on south side. Hence, too little clearance afforded for safe, efficient two-way operation.

- All streets south of Dufferin Avenue and west of McNaughton Avenue are narrow and circuitous, serving old residential area. None are suited to carry heavy traffic. James Street is the only route to pass completely across area: hence, inordinately heavy traffic load imposed.

- Visibility to south (i.e. over Lord Selkirk Bridge) afforded eastbound motorists at James/McNaughton intersection severely restricted by bridge girders and steepness of bridge approach.

- Police control necessary at James/McNaughton intersection during peak periods. Lengthy back-ups occur. Intersection redesign, involving approach widening, required.

E.2.4 King Street

Herbert Street to east Town Limit

Operating Speed Range: 16 to 26 m.p.h.

- Westernmost block operates two-way, but functions as eastbound complement to one-way westbound block of Wallace Street. Hence, eastbound to northbound left-turn movement at King/McDougall intersection is heavy. Since King Street is relatively wide, turns do not cause serious delay.

- Visibility to north-east (along Wallace Street) afforded westbound King Street motorists at Wallace/King/Herbert intersection, is badly restricted due to sharp skew. Great care must be exercised when entering Wallace Street, a through street. Channelization and other intersection modifications required.

- East of Bridge Street, King Street serves older, developed residential area. No major source of delay noted.

- C. & O. crossing badly skewed, and not protected by warning signals. However, train movements are slow and relatively infrequent, and visibility is largely unrestricted. Care needed at night, however, as C. & O. crossing area is unlighted, and King Street roadway lighting ends here.

- Gravel-surfaced east of C. & O. crossing. Typical rural township road cross-section.

E.2.5 Lisgar Street

Elgin Street to Dufferin Avenue

Operating Speed Range: 4 to 19 m.p.h.

- Visibility somewhat restricted at Elgin/Lisgar intersection. Elgin Street turns here, and building in south-east quadrant has little or no set-back.

- One-way southbound block (Wellington to Dufferin) discussed in subsection E.1.2.

- No other sources of delay noted.

E.2.6 Murray Street

Wallace Street to McNaughton Avenue

Operating Speed Range: 13 to 25 m.p.h.

- Was original Highway 40 route serving Wallaceburg from the south.
- Pavement surface fair, buildings well set back, overall visibility excellent.
- Curb parking permitted one side only.
- Sharply skewed McNaughton/Murray intersection discussed in subsection E.1.1.
- Drainage of road appears poor. Considerable ponding observed along shoulders, and even on pavement itself at certain points.
- C. & O. crossing protected by warning signals. Visibility good.
- Visibility somewhat restricted to the west at Wallace/Murray intersection, as Wallace Street curves sharply, just west of Murray Street.

E.2.7 Nelson Street

James Street to north Town Limit

Operating Speed Range: 6 to 22 m.p.h.

- Important to CBD circulation (i.e. street frequently used for trip reversals made necessary by one-way street system).
- Lined with commercial outlets between James and Elizabeth Streets. Wide pavement on this section allows for metered curb parking both sides plus two-way traffic. However, left-turn delays at James/Nelson and Wellington/Nelson intersections indicate that additional approach capacity is required.
- Visibility to east restricted at Wellington/Nelson intersection, due to minimal set-backs established for building in south-east quadrant. Problem accentuated because of relatively fast-moving one-way westbound arterial traffic on Wellington Street.
- North of Elizabeth Street, pavement is quite narrow, with curb parking permitted one side only.

- A pleasant residential street, not presently suitable for heavy traffic.

- Visibility restricted at skewed University/Nelson intersection.

- Visibility fair over Running Creek bridge.

- Gravel-surfaced north of Running Creek. No roadway lighting.

- Curving alignment north of Running Creek; typical rural township road cross-section.

- Refer to subsection E.1.6 for comments concerning visibility at Third Concession/Nelson intersection.

E.2.8 Running Creek Drive

University Avenue to Forhan Street
(including short section of Gordon Street)

Operating Speed Range: 15 to 20 m.p.h.

- Pleasant residential street. No curbing, relatively narrow pavement, poorly defined shoulders.

- Visibility uniformly good.

- Awkward intersection at Brander/Selkirk/Running Creek. Some attention to stop line and stop sign placement required: visibility somewhat restricted for motorists on Brander Avenue and Selkirk Street.

- Traffic volumes relatively low. No major sources of delay noted.

E.2.9 Wallace and Gillard Streets

(including Pearl Street, and the Gillard-to-Wallace block of Herbert Street)

South-west Town Limit to east Town Limit

Operating Speed Range: 10 to 30 m.p.h.

- Principal access to industrial area south of Sydenham River*.

- South and west of C. & O. crossing, route very narrow and tortuously aligned. No curbing. Pavement surface poor, roadway lighting largely non-existent. Large numbers of heavy trucks and transports restrict visibility at intersections and cause delays due to narrowness of pavement.

- No guard posts or railings between roadway and edge of Sydenham River: particularly hazardous at night, and during winter.

- Very sharp 90-degree turn at south end of Wallace Street. Especially restrictive for large trucks. Roadways gravel-surfaced in this area.

- On-street and off-street parking areas not well defined physically.

- On-street parking further restricts capacity of narrow roadway.

- Visibility restricted at Base Line/Wallace intersection due to hydro towers, shrubbery, etc. Restriction partiularly severe for northbound motorists. Also, Wallace Street curves near Base Line (see also subsection E.1.3).

- Wallace Street roadway allowance width badly restricted between Huron Street and Base Line. Street passes between two industrial structures; clearance further restricted by frequent, slow movements of heavy trucks between buildings.

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* It is the Town's intention to extend Gillard Street from Pearl Street across the Chesapeake and Ohio Railway to Base Line, and perhaps beyond. Presumably, the new facility will be designed as an industrial service roadway, and will replace Wallace Street as the principal access route to this area. The Wallace Street right-of-way thus replaced could become either a local service lane, or could be subdivided and sold to local industrial concerns, for redevelopment purposes.

- Visibility badly restricted in Huron Street vicinity. Intersection pavement very poorly defined. Wallace Street narrow and sharply curved. Parked vehicles, heavy trucks and minimal building set-backs accentuate restrictions on visibility and smooth operation. When large trucks are parked at edge of road, Wallace Street is reduced to single-lane effective width.

- C. & O. crossing not protected by warning signals or gates. Due to hump in Wallace Street roadway profile at railroad crossing, motorists' visibility is quite restricted on crossing approaches.

- Wallace Street operates one-way westbound between McNaughton Avenue and Pearl Street.

- Turning radii at Wallace/Pearl intersection very restricted. Large trucks and transports occupy entire pavement area when turning.

- No channelization to signify beginning of one-way street. Pavement width on Wallace Street remains the same, both east and west of Pearl Street; hence, many eastbound drivers inadvertently continue east on Wallace Street. Improved signing, including prominently displayed symbolic "RIGHT TURN ONLY" signs required, facing west at Wallace/Pearl intersection.

- Visibility restricted at Pearl/Gillard intersection for both directions of movement due to minimal set-backs established for house in north-east quadrant.

- Visibility restricted for eastbound motorists at Montgomery/Gillard intersection, largely because of high hedge on south side of Gillard Street.

- Between Pearl and Herbert Streets, both Wallace and Gillard Streets are fairly narrow residential routes. When Gillard Street (extension) becomes principal industrial access route, widening and intersection improvements will be required.

- Considerable congestion occurs at McNaughton Avenue intersections with both Wallace and Gillard Streets. Police control required during peak traffic periods. Wallace Street (westbound) approach at McNaughton/Wallace intersection should be widened to allow for additional (right turn) lane (see also subsection E.1.1).

- Visibility somewhat restricted at Gillard/Herbert/Queen intersection due to small set-backs established for buildings in north-west and south-west quadrants.

- Motorists following Gillard/Queen route must execute fairly severe jog at Herbert Street.

- Visibility to east and south (i.e. along King and Herbert Streets, respectively, from Wallace Street eastbound) restricted at Wallace/King/Herbert intersection due to minimal set-backs established for church in south-west quadrant.

- Visibility also restricted for northbound motorists on Herbert Street, at King and Wallace Streets, because of church in south-west quadrant. Particularly difficult to see eastbound vehicles on Wallace Street approaching intersection (see also subsection E.2.4).

- Some revision of stop sign locations at Wallace/McDougall and King/McDougall intersections may be warranted. Considerable interruption of smooth flow on Wallace Street now occurs. Appears illogical to stop westbound Wallace Street and eastbound King Street flows, as these represent heaviest movements in this area.

  Pattern of through movements suggested for immediate implementation*:

  EASTBOUND

  Wallace onto King onto McDougall, then after facing stop sign at McDougall/Wallace, make right turn back onto Wallace.

  i.e. remove stop sign facing eastbound traffic at McDougall/King intersection.

  It appears that pedestrian movements across King Street are relatively few in number; hence, change suggested would not cause either danger or undue inconvenience.

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* Refer to Exhibit 4.D, for recommended ultimate improvements.

WESTBOUND

Uninterrupted flow on Wallace Street, or from Wallace turning left (southbound) onto McDougall Street.

No vehicle conflicts would arise, as northbound traffic on McDougall Street would still face stop sign at Wallace Street, and Wallace Street operates one-way westbound between McDougall and Herbert/King Streets. Pedestrian movements between northernmost block of McDougall Street and King Street could be confined to west side of Wallace/McDougall intersection, without causing undue inconvenience.

- Congestion often occurs between McDougall and Murray Streets, due to parking and unparking manoeuvres. Roadway is narrow, and alignment is sharply curved. As area changes and redevelopment of riverside properties takes place, it may be advisable to prohibit curb parking on this section. Refer to subsection E.2.6 for discussion of Murray/Wallace intersection.

- Wallace Street becomes residential route east of Murray Street. East of Prince Street, roadway lighting ends, and gravel surface begins. Typical rural township road cross-section. Gently curved, quite pleasant riverside drive.

- Visibility somewhat restricted on curves near cemetery, because of hedges and other vegetation growing quite close to travelled portion of roadway: restrictions particularly evident when groups of cars approach or leave cemetery.

E.2.10 Water Street

Margaret Avenue to north Town Limit

Operating Speed Range: 14 to 25 m.p.h.

- Margaret/Water intersection very close to east approach of Dundas Bridge. Visibility only fair here, due to relatively small set-back of building in north-west quadrant.

- Very narrow pavement. Houses not set back from roadway allowance.

- Visibility somewhat restricted by curved alignment south of Miles Street.

- Gravel-surfaced north of Otter Creek. No roadway lighting. Typical rural township road cross-section.

- Sharp curves near Third Concession. Visibility quite restricted at intersection.

- No critical sources of delay noted, but in present condition, route not suitable for major traffic flows.

E.2.11 <u>University Avenue</u>

Elgin Street to Nelson Street

Operating Speed Range: 16 to 25 m.p.h.

- Serves well-developed residential area and several schools.

- A pleasant street, with well set-back houses.

- Visibility somewhat restricted at Elgin/University intersection, due to sharp bend in Elgin Street immediately east of University Avenue (see also subsection E.2.2).

- Visibility somewhat restricted at Nelson/University intersection due to skewed angle of approach (see also subsection E.2.7).

- Traffic volumes relatively low. No major sources of delay noted.

URBAN ROADWAY CHARACTERISTICS

AND

RECOMMENDED DESIGN STANDARDS

ROUTE CLASSIFICATION	URBAN ARTERIAL			URBAN COLLECTOR		URBAN LOCAL	
	4-lane	2-lane	3-lane one-way	4-lane	2-lane	Residential Areas	Industrial and Commercial Areas
Connects to (1)	Arterials and Collectors			Arterials, Collectors and Locals		Collectors and Locals	
Percentage of miles (1)	30 approximately					70 approximately	
Percentage of vehicle-miles (1)	Varies 25-65			Varies 20-30		Varies 2-10	
Traffic service (1)	Traffic movement primary consideration			Traffic movement and land access of equal importance		Traffic movement secondary consideration	
Land service (1)	Land access secondary consideration					Land access primary consideration	
Characteristics of traffic flow (1)	Uninterrupted flow except at signals and cross-walks			Interrupted flow		Interrupted flow	
Access Control	Limited - should be detailed			Driveways grouped where possible (Single - 12'; Double - 20')		One driveway per dwelling	Yield signs where required
Commercial Loading Facilities	All Loading/Unloading on private property			Loading/Unloading Zones		None	On private property
Vehicular Traffic Control	Signals where warranted, and channelization			Normal warrants		Yield and stop signs where warranted	
Pedestrian Traffic Control	C R O S S - W A L K S A T I N T E R S E C T I O N S						
Sidewalks	<u>None</u>, <u>One Side</u> or <u>Both Sides</u>, depending upon nature and intensity of frontage development, and upon safety considerations						
Railway Crossing B.O.T.C. requirements	CROSSING SIGNALS AND ADVANCE WARNING SIGNS					No Crossing	Crossing Signals and Signs
Range of average daily traffic volume, (vehicles per day) (1)	5,000 - 30,000			1,000 - 12,000		Not applicable	
Vehicle type	All types up to 20% trucks			All types		Passenger and service vehicles	All types
Load Restrictions	None	None	None	No heavy trucks 8:00 P.M. - 7:00 A.M.		No heavy trucks	None
Design Speed (m.p.h.)	40 minimum	40 minimum	40 minimum	35	35	N/A	N/A
Average running speed off-peak conditions (1)	Varies 30-40			Varies 20-30		Varies 15-20	
Maximum Grade (2)	3%	3%	3%	4%	4%	6%	3%
Maximum Approach Grade at Intersection	2% x 100'	2% x 100'	2% x 100'	2% x 50'	2% x 50'	2% x 30'	2% x 100'
Maximum Degree of Horizontal Curve	11.5°	11.5° (Minimum Radius - 500')	11.5°	15.0° (Minimum Radius - 385')	15.0°	90° Corners	
Maximum Rate of Superelevation (ft./ft.)	0.06	0.06	0.06	0.06	0.06	0.08	0.06
Minimum Stopping Sight distance - Crest and Sag Vertical Curves (ft.) (3)	275	275	275	250	250	200	200
Right-of-Way Width (ft.) Minimum Desirable	66 86	66 86	66 66	66 86	66 66	50 66	66 86
Traffic Lane Width (ft.)	12	12	12	2 x 11 2 x 10	11	11	12
Parking Lane Width (ft.) (4)	Nil	10 one side	Nil	Nil	10 one side	8 one side	10 one side (5)
Total Pavement Width (ft.) (6)	48	34	36	42	32	30	34
Minimum Curb Corner Radius (ft.) (7)	35	35	35	30	30	25	35
Curb Design	B A R R I E R T Y P E						Mountable Roll Type (5)

<u>NOTES</u>:

(1) Obtained from: "Road Classification, Rural and Urban - 1964"
Technical Publication No. 26
Canadian Good Roads Association,
Ottawa, Canada - April 1965.

(2) Could be exceeded for very limited distances (e.g. on bridge approaches).

(3) Based upon Height of Eye of 4 ft. 6 ins., and Height of Object of 4 ins.

(4) Parking could be permitted on four-lane major streets (i.e. pavement width: 42' or 48') during off-peak periods.

(5) If large numbers of heavy multi-unit trucks use such routes, parking on the pavement could be prohibited. It is suggested that mountable roll-type curbs and stabilized shoulders at least 10 feet (preferably 12 feet) in width be provided for truck parking or waiting.

(6) In areas not intensively developed, a pavement 24 feet in width, plus stabilized shoulders at least 10 feet in width, would generally suffice for major routes carrying less than 5,000 vehicles per day. Widening to conform with above standards, and establishment of urban roadway characteristics (i.e. storm drainage, curb and gutter, etc.) could be delayed until nearby urban development becomes intensive.

(7) Where roadway allowance width permits, compound curves should be used instead of simple curb radii, on arterial routes and industrial area routes carrying large numbers of long, heavy articulated vehicles.

RECOMMENDED PAVEMENT WIDTHS
FOR
MAJOR ROUTES

PART I - ARTERIAL ROUTES

ROUTE	FROM	TO	TOTAL PAVEMENT WIDTH (ft.)	APPROXIMATE LENGTH OF SECTION (ft.)
BASE LINE(1)	Sydenham River	E. Town Limit(2)	34(3)	5,400
DUFFERIN AVENUE(4)	W. Town Limit(2)	Lisgar St. and McNaughton Ave.	48	6,400
DUFFERIN AVENUE (one way eastbound)	Lisgar St. and McNaughton Ave.	James St.	36	300
FORHAN STREET OR ELM DRIVE(5) (AND ELM DR. EXTENSION)	Libby St.	Elgin St.	48	5,400
FORHAN STREET	Elgin St.	Third Concession	34	3,600
FORK STREET(6)	N.A.	N.A.	N.A.	N.A.
GILLARD STREET	Base Line	Herbert St.	48	5,200
JAMES STREET (one-way eastbound)	Dufferin Ave.	Dundas Bridge	36	1,600
LIBBY STREET	W. Town Limit(2)	Sydenham River	34(7)	5,200
LISGAR STREET (one-way southbound)	Wellington St.	Dufferin Ave.	36	100
MAIN STREET	Margaret Ave.	Elgin St. (Extension)	48	1,200
MAIN STREET (EXTENSION)	Elgin St. (Extension)	North Branch River Road, approx. 1,000 ft. north of Third Concession	34	4,000
MARGARET AVENUE	Dundas Bridge	Elgin St. (Extension)	48	5,300
MARGARET AVENUE(8)	Elgin St. (Extension)	Kent County Road No. 31	34	1,200
McNAUGHTON AVENUE(9)	S. Town Limit(2)	Gillard St.	48	6,300
McNAUGHTON AVENUE	Gillard St.	Dufferin Ave.	(10)	1,000
MURRAY STREET	McNaughton Ave.	Wallace St.	48	4,500
QUEEN STREET	Herbert St.	Murray St.	48	800
QUEEN STREET (AND QUEEN ST. EXTENSION)	Murray St.	Wallace St., approx. 2,400 ft. east of Albert St.	34	3,200
THIRD CONCESSION	Forhan St. OR Elm Dr.	Nelson St.	34	1,600 (to Forhan St.) OR 3,500 (to Elm Dr.)
WALLACE STREET	Queen St. (Extension) approx. 2,400 ft. east of Albert St.	E. Town Limit(2)	34	3,000
WELLINGTON STREET(6) (one-way westbound)	Dundas Bridge	Lisgar St.	36	1,800

NOTES:

(1) Becomes Kent County Road 15, east of Highway 40.

(2) It is assumed that roadway would be improved as far as major intersection nearest Town Limit, or proposed 1985 limit of urban development. Refer to Exhibit 4.A.

(3) If Libby - Base Line Bridge is built, pavement widening to 48 feet may be warranted, west of Highway 40.

(4) Becomes Highway 40, at Town Limit.

(5) If Forhan Street is closed to through traffic south of the C. & O. Railway crossing, Elm Drive would become the major north-south arterial route in this area. Only one route would have to be developed to the standards indicated.

(6) Fork Street would be replaced by the eastward extension of Wellington Street, which would meet James Street at the Dundas Bridge.

(7) If Libby - Base Line Bridge is built, pavement widening to 48 feet may be warranted, between the bridge and Forhan Street OR Elm Drive (see also, note (5)).

(8) Becomes Highway 78, at Town Limit.

(9) Becomes Highway 40, south of Base Line Road.

(10) Pavement width varies between Dufferin Avenue and Gillard Street, because of existing two-lane Lord Selkirk Bridge, and intersection layout in the James Street/ Dufferin Avenue vicinity. See Exhibit 4.C.

RECOMMENDED PAVEMENT WIDTHS
FOR
MAJOR ROUTES (CONTINUED)

PART II - COLLECTOR ROUTES

ROUTE	FROM	TO	TOTAL PAVEMENT WIDTH (ft.)	APPROXIMATE LENGTH OF SECTION (ft.)
ALBERT STREET	Base Line	Wallace St.	32	4,900
CREEK STREET(1)	James St.	University Ave.	32	2,400
DORA DRIVE	Margaret Ave.	Thomas Ave.	32	800
DUNDAS STREET	Margaret Ave.	Elgin St. (Extension)	32	1,300
ELGIN STREET	Elm Dr. (Extension)	Sydenham River North Branch	42	5,800
ELGIN STREET (EXTENSION)	Sydenham River North Branch	Dundas St.	42	1,800
ELGIN STREET (EXTENSION)	Dundas St.	West end of Thomas Ave. approx. 300 ft. west of Dora Dr.	32	1,600
ELM DRIVE(2)	Argyle Ave.	Dufferin Ave.	42	1,200
ELM DRIVE (EXTENSION-S)	Libby St.	Argyle Ave.	42	3,400
ELM DRIVE (EXTENSION-N)	Dufferin Ave.	Elgin St.	42	900
GEORGE STREET	Forhan St.	Oak St.	32	300
HERBERT STREET	Gillard and Queen Sts.	King St.	34(3)	300
JAMES STREET	Oak St.	McNaughton Ave.	32	1,600
KING STREET	Herbert St.	Murray St.	42	900
KING STREET(4)	Murray St.	Queen St. (Extension) (E. Town Limit)	32	1,800
LISGAR STREET	Wellington St.	Elgin St.	32	700
NELSON STREET	James St.	Elgin St.	42	1,000
NELSON STREET	Elgin St.	Third Concession (N. Town Limit)	32	3,300
OAK STREET	James St.	George St.	32	800
RUNNING CREEK DRIVE(5)	Forhan St.	University Ave.	32	2,300
THOMAS AVENUE and THOMAS AVENUE EXTENSION	West end of Thomas Ave. approx. 300 ft. west of Dora Dr.	River Rd. approx. 1,100 ft. east of Highland Dr.	32	2,500
UNIVERSITY AVENUE	Elgin St.	Nelson St.	32	2,500
WALLACE STREET	McNaughton Ave.	Queen St. (Extension) approx. 2,400 ft. east of Albert St.	32	5,200

NOTES:

(1) Includes a short section of Brander Avenue.

(2) Should be widened to achieve recommended ARTERIAL ROUTE standards, in the event that Elm Drive (and extensions) takes over arterial function from Forhan Street (see Part I; Note (5)).

(3) Additional width to allow for angle parking manoeuvres and clearance on curve (see Exhibit 4.D).

(4) As indicated on Exhibit 4.A, King Street should become discontinuous at Queen Street (Extension), in order to eliminate badly skewed at-grade crossing of the C. & O. Railway - The Gillard/Queen/Wallace arterial route would diminish the importance of King Street as a major collector route: hence, the "jog" introduced into its alignment would not cause undue inconvenience. Moreover, two quite broadly spaced "T" intersections between King Street and Queen Street (Extension) would result, in place of a single jogged or skewed junction, very close to the C. & O. Crossing.

(5) Includes a short section of Gordon Street.

(6) Should be renamed "Elgin Street", with house numbers modified to suit, if practicable.

GENERAL NOTES:

Pavement widenings and other design irregularities encountered at bridge approaches and at major intersections are not considered here. Only basic pavement widths are stipulated.

"TENTATIVE MAJOR ROUTES" indicated •••••••• on Exhibit 4.A cannot be treated individually at this point. Excepting the few locations where some form of roadway currently exists (e.g. Arnold Street, Mason Street, Maplewood Crescent), alignments shown merely represent suggestions: ultimate routings will certainly be influenced by the nature and rate of urban development. Design should, of course, conform to the roadway design standards presented in Appendix F.

INTERSECTION CAPACITIES

PART I

(i) APPROACH	(ii) LEG	(iii) 100% GREEN APPROACH CAPACITY	(iv) % GREEN (1)	(v) PRACTICAL CAPACITY	(vi) PEAK HR. APPROACH VOLUME (2)	(vii) k (vi)÷(v)	(viii) POSSIBLE CAPACITY	(ix) THEORETICAL PEAK HOUR DEMAND (3)	(x) K DEGREE OF SATURATION (ix)÷(viii)	(xi) REMARKS
(1) DUFFERIN/FORHAN										
Forhan	N	850	40	340	113	0.33	425	152	0.36	- Signal-controlled at time of survey - 56%/34% cycle split preferable for prevailing conditions, but - Dufferin St. should be widened west of Forhan St.
Forhan	S	730	40	290	220	0.76	362	176	0.48	
Dufferin	E	1,540	50	770	535	0.70	964	812	0.84	
Dufferin	W	980	50	490	496	1.01	613	588	0.96	
(2) DUFFERIN/LISGAR/ McNAUGHTON										
Lisgar (R.T.+ straight	N	1,540	39	585	481	0.83 (4)	792	776	0.98 (5)	- Signal-controlled at time of survey - Cycle split appears O.K. but geometric improvement required - E. LEG operates one-way eastbound
Lisgar (L.T.		750	13	97	50	0.52	121	64	0.53	
McNaughton	S	2,040	30	610	221	0.36	764	216	0.28	
Dufferin	E	-	-	-	-	-	-	-	-	
Dufferin	W	1,545	30	580	464	0.80	724	600	0.83	
(3) JAMES/ McNAUGHTON										
McNaughton	N	1,520	60	915	562	0.61	1,144	716	0.63	- Geometric improvement required - E. LEG operates one-way eastbound
McNaughton	S	1,520	60	915	510	0.54	1,144	568	0.49	
James	E	-	-	-	-	-	-	-	-	
James	W	1,000	20	200	102	0.51	250	172	0.69	
(4) WELLINGTON/ LISGAR										
Lisgar	N	1,560	30	470	96	0.20	588	112	0.19	- Geometric improvement required - S. LEG operates one-way southbound
Lisgar	S	-	-	-	-	-	-	-	-	
Wellington	E	1,850	60	1,110	454	0.44	1,392	532	0.38	
(5) JAMES/WILLIAM										
William	N	1,300	15	195	35	0.18	244	44	0.18	- E.& W. LEGS operate one-way eastbound
William	S	1,300	15	195	0	0	244	0	0	
James	E	-	-	-	-	-	-	-	-	
James	W	1,100	75	827	756	0.92	1,135	824	0.72	
(6) WELLINGTON/ WILLIAM										
William	N	600	20	120	15	0.13	150	12	0.08	- E.& W. LEGS operate one-way westbound
William	S	860	20	172	65	0.38	216	72	0.33	
Wellington	E	1,950	70	1,365	587	0.43	1,708	692	0.40	
Wellington	W	-	-	-	-	-	-	-	-	
(7) JAMES/DUNCAN										
Duncan	N	950	40	380	33	0.09	475	28	0.06	- Signal-controlled at time of survey - Signal not required for vehicular traffic; however, pedestrians make use of it - Capacity on James St. would double if curb parking were removed. - E. & W. LEGS operate one-way eastbound
Duncan	S	950	40	380	0	0	475	0	0	
James	E	-	-	-	-	-	-	-	-	
James	W	1,100	50	550	684	1.24	688	764	1.11	
(8) JAMES/NELSON										
Nelson	N	900	20	180	70	0.39	225	92	0.41	- E. & W. LEGS operate one-way eastbound
Nelson	S	700	20	140	0	0		0	0	
James	E	-	-	-	-	-	-	-	-	
James	W	2,700	70	1,890	559	0.30	2,360	572	0.24	
(9) WELLINGTON/ NELSON										
Nelson	N	700	30	210	93	0.44	262	144	0.55	- E. & W. LEGS operate one-way westbound
Nelson	S	700	30	210	117	0.56	262	116	0.44	
Wellington	E	2,300	60	1,380	490	0.35	1,725	492	0.29	
Wellington	W	-	-	-	-	-	-	-	-	
(10) JAMES/FORK										
Fork	N	-	-	-	-	-	-	-	-	- N. LEG operates one-way northbound (limiting capacity northbound = 2,200 v.p.h.)
James	E	1,050	80	840	276	0.33	1,050	346	0.33	
James	W	2,700	80	2,160	433	0.20	2,700	516	0.19	
(11) MARGARET/WATER										
Water	N	950	30	285	57	0.20	356	52	0.15	
Margaret	E	1,050	60	630	217	0.34	787	264	0.34	
Margaret	W	1,050	60	630	293	0.46	787	420	0.53	

INTERSECTION CAPACITIES (CONTINUED)

PART I (cont'd.)

(i) APPROACH	(ii) LEG	(iii) 100% GREEN APPROACH CAPACITY	(iv) % GREEN (1)	(v) PRACTICAL CAPACITY	(vi) PEAK HR. APPROACH VOLUME (2)	(vii) k (vi)÷(v)	(viii) POSSIBLE CAPACITY	(ix) THEORETICAL PEAK HOUR DEMAND (3)	(x) K DEGREE OF SATURATION (ix)÷(viii)	(xi) REMARKS
(12) FORHAN/ELGIN										
Forhan	N	800	45	360	49	0.14	450	56	0.12	
Forhan	S	700	45	315	67	0.21	394	96	0.24	
Elgin	E	950	45	427	56	0.13	534	76	0.14	
Elgin	W	700	45	315	41	0.13	394	72	0.18	
(13) LISGAR/ELIZABETH										
Lisgar	N	700	45	315	70	0.22	394	132	0.34	
Lisgar	S	850	45	383	84	0.22	479	76	0.16	
Elizabeth	E	700	45	315	106	0.34	394	132	0.34	
Elizabeth	W	700	45	315	84	0.27	394	116	0.29	
(14) McNAUGHTON/WALLACE										
McNaughton	N	900	65	585	542	0.82	731	660	0.90	- Heavy right turn movement Wallace to McNaughton: geometric improvement required
McNaughton	S	900	65	585	329	0.56	731	308	0.42	
Wallace	E	700	25	175	205	1.17	256	252	0.98	
Wallace	W	-	-	-	-	-	-	-	-	- W. LEG operates one-way westbound
(15) McNAUGHTON/GILLARD										
McNaughton	N	900	70	560	498	0.89	700	492	0.70	
McNaughton	S	900	70	560	216	0.39	700	224	0.32	
Gillard	E	700	20	140	89	0.64	175	140	0.80	
Gillard	W	700	20	140	98	0.70	175	140	0.80	
(16) WALLACE/KING/HERBERT										
Wallace	N-E	1,000	45	450	124	0.28	562	136	0.24	
Wallace	S-W	700	45	315	76	0.24	394	96	0.24	
Herbert	S	700	45	315	99	0.31	394	196	0.50	
King	E	1,050	45	472	60	0.13	590	76	0.13	

NOTES:

(1) At non-signalized intersections, theoretical phase patterns have been devised (see text of report, subsection 2.2.3).

(2) Recorded on typical business days during August, 1964. Peak traffic flows at virtually all intersections and A.T.R. locations were observed between 4:00 and 6:00 P.M. Actual peak hour established for the Wallaceburg major route network is 4:30 - 5:30 P.M.

(3) Observed peak 15-minute volume multiplied by 4.

(4) Assume critical k value for N Approach = 0.83

(5) Assume critical K value for N Approach = 0.98

PART II INTERSECTION CAPACITY ANALYSIS

Analysis methods employed here are recommended in The Highway Capacity Manual, prepared by the Committee on Highway Capacity, Department of Traffic and Operations, Highway Research Board (U.S.A.). Recently updated nomographs and tables, used for the Wallaceburg Study, are to appear in the revised edition of the Manual.

Capacity analyses were undertaken at 16 major intersections, including the three presently controlled by traffic signals. For each of the 13 locations not so controlled, theoretical signal cycles have been devised. These are compatible with cycles at nearby signalized intersections: the "green signal time" assigned to a given traffic movement is proportional to the percentage of total intersection approach volume represented by that movement.

The foregoing tabulation (Appendix H, Part I) indicates Practical Capacity and Possible Capacity for each intersection approach. Greater volumes could not be handled without introducing severe congestion and potential hazards. In each case, "Theoretical Peak Hour Demand" is compared with Possible Capacity to obtain one measure of intersection approach saturation. The relationship between the two volume-capacity ratios (small "K" and large "K") presented in the tabulation is such that:

- where the peak quarter-hourly volume is less than 30% of the peak hourly volume, the highest V-C ratio is based upon Practical Capacity; and
- where the peak quarter-hourly volume is more than 30% of the peak hourly volume, the highest V-C ratio is based upon Possible Capacity.

The significance of this comparison is that some congestion might be tolerated over a fifteen-minute period, whereas any normal intersection should be capable of handling the total traffic volume imposed upon it during a full hour.

DELAYS
AT
BASCULE BRIDGES AND RAILROAD CROSSINGS

PART I - BASCULE BRIDGES(1)

NUMBER OF BRIDGE OPENINGS(2) (According to Bridge Logs for 1963 & 1964)			AVERAGE DURATIONS OF BRIDGE OPENINGS
MONTH	LORD SELKIRK BRIDGE (Hwy. 40)	DUNDAS BRIDGE (Hwy.78)	
January February March	NEGLIGIBLE. PERIODIC TESTING OF MECHANISM ONLY	NEGLIGIBLE NUMBER OF OPENINGS. OPENED PERIODICALLY IN ORDER TO TEST MECHANISM. MAX. 6 to 12 TIMES ANNUALLY.	Pleasure Craft - 6 minutes Loaded Freighters, Tugs and Barges - 8 minutes(3) Maximum Estimated Bridge Opening Duration: 10 minutes
April	6		
May	74		
June	155		
July	205		
August	216		
September	145		
October	56		
November	3		
December	2		

NOTES:

(1) Clearance of each bridge above high water level = 12 feet.

(2) Bridge openings are most frequent between 1:30 and 4:30 P.M. on Fridays, Saturdays and Sundays during the summer.

(3) Largest vessel currently plying Sydenham River is the stone carrier "COALFAX".

Dimensions: Beam - 43 ft. 2 ins.
Length - 253 ft. 0 ins.
Loaded Draft - 17 ft. 0 ins.

Minimum Height above Water Level when Loaded (estimated) - 50 ft.

Maximum Height above Water Level when empty and in Ballast - 85 ft.

PART II - RAILROAD CROSSINGS

(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
EXISTING MAJOR STREET GRADE CROSSING	NUMBER OF DAILY CROSSINGS AVG.	MAX.	MAX. DELAY DURATION (min.) (1)	TOTAL DAILY DELAY (min.) AVG.	MAX.	Est. AADT (2) on MAJOR STREET	EXPOSURE INDEX-1964 (iii)X(vii) (3)
Between the Chesapeake and Ohio Railroad and:							
DUFFERIN AVE. (Hwy. No. 40)	4	6	5	20	30	8,130	48,780
FORHAN ST.	4	6	5	20	30	2,530	15,180
JAMES ST.	4	6	5	20	30	2,000	12,000
WALLACE ST.	4	6	5	20	30	1,200	7,200
McNAUGHTON AVE. (Hwy. No. 40)	4	6	5	20	30	5,850	35,100
MURRAY ST.	4	6	5	20	30	2,000	12,000
ALBERT ST.	4	6	5	20	30	500	3,000
KING ST.	4	6	5	20	30	300	1,800

NOTES:

(1) Infrequently, during navigation season, delays may exceed five minutes due to opening of Sydenham River railroad bridge.

(2) These figures are based upon Average Weekday Traffic (AWDT) volumes portrayed by Exhibit 2.C, modified where appropriate to indicate Average Annual Daily Traffic (AADT) volumes.

(3) According to County Roads Needs Study - 1964, Inventory Manual, prepared by the Department of Highways, Ontario; when the Exposure Index equals or exceeds 75,000, grade separation should be considered if physically feasible. Such relatively low Exposure Indices are suitable for establishing grade separation warrants for rural highways, where vehicle speeds are high. However, comparing this with an example of an urban standard, the Traffic Engineering Division of the City of Calgary, Alberta, in the November, 1964 report, Calgary Area Transportation Study - Technical Report 2 - Traffic Characteristics, 1963-64 states:

"As a standard, an (Exposure) Index of 200,000 or greater indicates the need for further study at a particular location".

Hence, it is apparent that both the maximum number of daily crossings and the AADT would have to double before grade separation could be justified, on the basis of Exposure Index, for the Dufferin Avenue crossing. Such conditions are not expected to arise before the end of the 20-year study period.

CENTRAL TRAFFIC DISTRICT CORDON CROSSINGS

8:00 AM to 6:00 PM - TYPICAL BUSINESS DAY - AUGUST 1964

LOCATION OF CORDON CROSSING (1)	MOTOR VEHICLES				PERSONS					
	INBOUND TO C.T.D.		OUTBOUND FROM C.T.D.		INBOUND TO C.T.D.			OUTBOUND FROM C.T.D.		
		% TRUCKS (2)		% TRUCKS (2)	WITHIN MOTOR VEHICLES	ON FOOT	TOTAL	WITHIN MOTOR VEHICLES	ON FOOT	TOTAL
DUNDAS BRIDGE	2,062	5.8	2,084	5.9	3,524	235	3,759	3,315	246	3,561
LAFONTAINE (North of Elizabeth) (3)	185	-	185	-	291	34	325	286	32	318
NELSON (North of Elizabeth)	399	3.8	396	3.8	566	153	719	603	132	735
DUNCAN (North of Elizabeth)	178	2.8	115	4.3	284	166	450	160	161	321
CREEK (North of Elizabeth) (3)	140	-	140	-	220	26	246	217	24	241
WILLIAM (North of Elizabeth)	89	6.6	127	1.6	137	78	215	212	74	286
CAMP (North of Elizabeth) (3)	110	-	110	-	174	20	194	170	19	189
ELIZABETH (East of Lisgar)	370	1.6	577	3.7	536	83	619	919	56	975
WELLINGTON (East of Lisgar)	-	-	3,979	4.2	-	87	87	6,091	130	6,221
DUFFERIN (East of Lisgar)	2,210	2.8	-	-	3,660	258	3,918	-	186	186
JAMES (East of McNaughton)	2,069	5.3	-	-	3,059	140	3,199	-	84	84
WALLACE (West of Herbert)	625	5.3	1,453	3.9	920	97	1,017	2,246	97	2,343
GILLARD (West of Herbert)	1,167	3.3	461	7.7	1,771	96	1,867	612	99	711
HERBERT (South of Gillard) (3)	180	-	180	-	285	33	318	278	31	309
QUEEN (East of Herbert)	283	3.5	598	2.7	401	83	484	931	75	1,006
KING (East of Herbert)	513	3.5	504	4.0	907	229	1,136	869	246	1,115
MURRAY (South of Wallace)	330	2.5	92	7.0	518	71	589	135	42	177
WALLACE (East of Murray)	318	2.5	227	3.2	492	188	680	350	190	540
ENTIRE CORDON	11,228	4.1	11,228	4.4	17,745	2,077 (10.5%)	19,822	17,394	1,924 (10.0%)	19,318

NOTES: (1) Listed in counter - clockwise order, commencing with DUNDAS BRIDGE.
(2) Average Percentage for entire cordon = 4.3.
(3) Directional split based upon summarized inbound and outbound movements at major cordon crossing points.

APPENDIX · K

PEDESTRIAN USAGE OF CENTRE BRIDGE

7:00 AM to 8:00 PM - TYPICAL BUSINESS DAY - AUGUST 1964

HOUR	TOTAL PEDESTRIANS			INTERVIEWS (3) (NORTHBOUND ONLY)		TRAVEL HABITS PRIOR TO CENTRE BRIDGE CLOSURE TO VEHICULAR TRAFFIC	
	Northbound (1)	Southbound (2)	TOTAL	NUMBER	% AGE	DROVE	WALKED
						TO JAMES STREET AREA	
7 - 8 A.M.	25	20	45	0	0	0	0
8 - 9	41	32	73	4	10.0	3	1
9 - 10	65	49	114	2	3.0	1	1
10 - 11	140	117	257	5	3.5	4	1
11 - 12 Noon	83	89	172	6	7.2	5	1
12 - 1	116	108	224	4	3.7	2	2
1 - 2	100	60	160	9	9.0	7	2
2 - 3	220	222	442	7	3.2	6	1
3 - 4	111	120	231	3	2.7	3	0
4 - 5	140	150	290	7	5.0	5	2
5 - 6	130	150	280	8	6.1	7	1
6 - 7	125	78	203	5	4.0	3	2
7 - 8 P.M.	168	100	268	7	4.2	6	1
TOTAL	1,464	1,295	2,759	67		52	1[illegible]
PER CENT	53.0	47.0	100.0		4.6	78.0	22.0

NOTES: (1) Toward James Street.
(2) Away from James Street.
(3) Trip Purposes of Interviewers:

		Trips	% Age
Work	-	6	9
General Business	-	28	42
Social Recreational	-	5	7
Shop		28	42
		67	100

PARKING CHARACTERISTICS

SIMPLIFIED PARKING STUDY
CENTRAL TRAFFIC DISTRICT

PART I

PARKING SPACE INVENTORY BY ZONE AND TYPE

CENTRAL TRAFFIC DISTRICT
AUGUST 1964

O-D ZONE NUMBER	METERED CURB 12-min.	METERED CURB 1-hour	METERED CURB 2-hour	NON-METERED CURB 30-min.	NON-METERED CURB no time limit	NON-METERED CURB truck loading zone	TOTAL CURB SPACES	PRIVATE OFF-STREET 15-min.	PRIVATE OFF-STREET no time limit	PUBLIC OFF-STREET (metered) 2-hour	PUBLIC OFF-STREET (metered) 5-hour	TOTAL OFF-STREET SPACES	TOTAL PARKING SPACES
110	-	16	39	10	4	-	69	-	82	27	10	119	188
120	4	50	2	-	-	6	62	-	95	28	-	123	185
130	-	-	-	-	82	-	82	-	19	-	-	19	101
140	-	10	-	-	62	3	75	-	40	62	8	110	185
150	-	34	-	-	51	6	91	12	119	-	-	131	222
TOTALS (CTD)	4	110	41	10	199	15	379	12	355	117	18	502	881
PER CENT	0.5	12.5	4.7	1.1	22.7	1.7	43.2	1.4	40.3	13.3	2.0	56.8	100.0

PART II

VEHICLES PARKED(1) BY ZONE AND SPACE TYPE

10:00 AM to 6:00 PM - AVERAGE WEEKDAY - AUGUST 1964

O-D ZONE NUMBER	METERED CURB(2)	NON-METERED CURB	TOTAL LEGAL CURB	ILLEGAL PARKING(3)	TOTAL CURB	PRIVATE OFF-STREET	PUBLIC OFF-STREET (metered)	TOTAL OFF-STREET	TOTAL VEHICLES PARKED
110	335	66	401	7	408	168	37	205	613
120	460	14(4)	474	42	516	208	178	386	902
130	-	108	108	6	114	64	-	64	178
140	43	185(4)	228	29	257	115	209	324	581
150	167	131(4)	298	6	304	257	-	257	561
TOTALS (CTD)	1,005	504(4)	1,509	90	1,599	812	424	1,236	2,835
PER CENT	35.5	17.8(4)	53.3	3.2	56.5	28.6	14.9	43.5	100.0

PART III

TURNOVER AND SPACE USAGE(1) BY ZONE

10:00 AM to 6:00 PM - AVERAGE WEEKDAY - AUGUST 1964

O-D ZONE NUMBER	AVAILABLE PARKING SPACES CURB	AVAILABLE PARKING SPACES OFF-STREET	NUMBER OF VEHICLES PARKED CURB	NUMBER OF VEHICLES PARKED OFF-STREET	PARKING TURNOVER CURB	PARKING TURNOVER OFF-STREET	PARKING TURNOVER ALL SPACES	AVAILABLE SPACE HOURS CURB	AVAILABLE SPACE HOURS OFF-STREET	SPACE HOURS USED CURB	SPACE HOURS USED OFF-STREET	PER CENT USAGE CURB	PER CENT USAGE OFF-STREET	PER CENT USAGE ALL SPACES
110	69	119	408	205	5.9	1.7	3.3	552	952	319	480	58	51	53
120	62	123	516	386	8.3	3.1	4.9	496	984	398	560	80	57	65
130	82	19	114	64	1.4	3.4	1.8	656	152	260	109	40	72	46
140	75	110	257	324	3.4	2.9	3.1	600	880	555	443	93	50	67
150	91	131	304	257	3.3	2.0	2.5	728	1,048	392	485	54	46	49
Sub-Totals	379	502	1,599	1,236	4.2	2.5		3,032	4,016	1,924	2,077	63	52	
TOTALS - ALL PARKING	881		2,835				3.2	7,048		4,001				57

PART IV

TURNOVER AND SPACE USAGE(1) BY SPACE TYPE

10:00 AM to 6:00 PM - AVERAGE WEEKDAY - AUGUST 1964

TYPE OF PARKING SPACE	AVAILABLE SPACES	NUMBER OF VEHICLES PARKED	PARKING TURNOVER	AVAILABLE SPACE HOURS	SPACE HOURS USED	PER CENT USAGE
METERED CURB:						
12-min.	4	38	9.5	32	19	59
1-hour	110	763	6.9	880	545	62
2-hour	41	204	5.0	328	153	47
NON-METERED CURB:						
30-min.	10	53	5.3	80	48	60
no time limit	199	420	2.1	1,592	998	63
truck loading zone	15	31	2.1	120	23	19
TOTALS - LEGAL CURB:	379	1,509	4.0	3,032	1,786	58
ILLEGAL CURB:	-	90	-	-	138	-
TOTALS - ALL CURB	379	1,599	4.2	3,032	1,924	63
PRIVATE OFF-STREET:						
15-min.	12	24	2.0	96	23	24
no time limit	355	787	2.2	2,840	1,689	59
PUBLIC OFF-STREET (metered):						
2-hour	117	414	3.5	936	352	38
5-hour	18	11	0.6	144	13	9
TOTALS - OFF-STREET	502	1,236	2.5	4,016	2,077	52
TOTALS - ALL PARKING	881	2,835	3.2	7,048	4,001	57

NOTES:
(1) Adjusted to reflect conditions of maximum parking usage throughout CTD.
(2) Includes overtime parking at meters.
(3) Includes illegal parking at curb (e.g. cars in truck loading zones, or in any "No Parking" areas), but NOT overtime parking at meters.
(4) Includes trucks parked in loading zones:

O-D Zone No.	No. of Trucks
120	14
140	7
150	10
Total	31
Per Cent	1.1

WALLACEBURG
TRAFFIC PLANNING STUDY

APPENDIX · M
SHEET 1 OF 2

PARKING CHARACTERISTICS

SIMPLIFIED PARKING STUDY
CENTRAL TRAFFIC DISTRICT

(CONTINUED)

PART V

PEAK PARKING HOUR SPACE USAGE(1) BY ZONE

3:30 to 4:30 PM - AVERAGE WEEKDAY - AUGUST 1964

O-D ZONE NUMBER	AVAILABLE PARKING SPACES		SPACE HOURS USED (3:30 TO 4:30 PM)		PER CENT USAGE (3:30 TO 4:30 PM)		
	CURB	OFF-STREET	CURB	OFF-STREET	CURB	OFF-STREET	ALL SPACES
110	69	119	47	68	68	57	61
120	62	123	56	74	90	60	70
130	82	19	41	16	50	84	56
140	75	110	73	67	97	61	76
150	91	131	50	74	55	57	56
Sub-Totals	379	502	267	299	71	60	
TOTALS - ALL PARKING	881		566				64

PART VI

PEAK PARKING HOUR SPACE USAGE(1) BY SPACE TYPE

3:30 to 4:30 PM - AVERAGE WEEKDAY - AUGUST 1964

TYPE OF PARKING SPACE	AVAILABLE SPACES(2)	NUMBER OF VEHICLES PARKED	SPACE HOURS USED	PER CENT USAGE
METERED CURB:				
12-min.	4	4	2	50
1-hour	110	121	77	70
2-hour	41	44	25	61
NON-METERED CURB:				
30-min.	10	7	6	60
no time limit	199	148	139	70
truck loading zone	15	1	2	13
TOTALS - LEGAL CURB:	379	325	251	66
ILLEGAL CURB:	-	6	16	-
TOTALS - ALL CURB	379	331	267	71
PRIVATE OFF-STREET:				
15-min.	12	8	5	42
no time limit	355	302	235	66
PUBLIC OFF-STREET (metered):				
2-hour	117	90	58	50
5-hour	18	2	1	6
TOTALS - OFF-STREET	502	402	299	60
TOTALS - ALL PARKING	881	733	566	64

PART VII

PARKING DURATION BY ZONE(1)

10:00 AM to 6:00 PM - AVERAGE WEEKDAY - AUGUST 1964

O-D ZONE NUMBER	DURATION OF PARKING(3)						TOTAL VEHICLES PARKED
	30-min. or less	30-min. to 1-hour	1-hour to 2-hour	2-hour to 3-hour	3-hour to 5-hour	Over 5-hour	
110 - CURB	296	75	22	5	8	2	408
OFF-STREET	69	37	37	13	18	31	205
TOTAL	365	112	59	18	26	33	613
120 - CURB	391	68	43	6	7	1	516
OFF-STREET	206	68	42	22	25	23	386
TOTAL	597	136	85	28	32	24	902
130 - CURB	30	26	19	11	12	16	114
OFF-STREET	24	7	18	4	10	1	64
TOTAL	54	33	37	15	22	17	178
140 - CURB	90	31	41	36	41	18	257
OFF-STREET	164	64	47	20	16	13	324
TOTAL	254	95	88	56	57	31	581
150 - CURB	200	25	30	19	18	12	304
OFF-STREET	87	56	52	25	17	20	257
TOTAL	287	81	82	44	35	32	561
TOTALS - CURB	1,007	225	155	77	86	49	1,599
OFF-STREET	550	232	196	84	86	88	1,236
GRAND TOTALS	1,557	457	351	161	172	137	2,835
PER CENT - CURB	62.9	14.1	9.7	4.8	5.4	3.1	100.0
OFF-STREET	44.4	18.9	15.8	6.8	6.9	7.2	100.0
TOTAL	54.8	16.2	12.3	5.7	6.1	4.9	100.0

PART VIII

PARKING DURATION BY SPACE TYPE (1)

10:00 AM to 6:00 PM - AVERAGE WEEKDAY - AUGUST 1964

TYPE OF PARKING SPACE	DURATION OF PARKING(3)						TOTAL VEHICLES PARKED
	30 min. or less	30-min. to 1-hour	1-hour to 2-hour	2-hour to 3-hour	3-hour to 5-hour	Over 5-hour	
METERED CURB:							
12-min.	38	-	-	-	-	-	38
1-hour	580	115	55	7	6	-	763
2-hour	153	34	10	4	2	1	204
NON-METERED CURB:							
30-min.	36	8	6	1	2	-	53
no time limit	118	61	72	60	66	43	420
truck loading zone	26	1	1	3	-	-	31
TOTALS - LEGAL CURB:	951	219	144	75	76	44	1,509
ILLEGAL CURB:	56	6	11	2	10	5	90
TOTALS - ALL CURB	1,007	225	155	77	86	49	1,599
PRIVATE OFF-STREET:							
15-min.	20	-	2	1	1	-	24
no time limit	268	132	148	70	83	86	787
PUBLIC OFF-STREET (metered):							
2-hour	255	100	44	11	2	2	414
5-hour	7	-	2	2	-	-	11
TOTALS - OFF-STREET	550	232	196	84	86	88	1,236
TOTALS - ALL PARKING	1,557	457	351	161	172	137	2,835
PER CENT	54.8	16.2	12.3	5.7	6.1	4.9	100.0

PART IX

ILLEGAL PARKING IN METERED SPACES

10:00 AM to 6:00 PM - AVERAGE WEEKDAY - AUGUST 1964

TYPE OF METERED PARKING SPACE	O-D ZONE NUMBER	TOTAL SPACE HOURS USED		ILLEGAL SPACE HOURS USED(4)		PER CENT ILLEGAL USAGE	
		By Zone	Totals	By Zone	Totals	By Zone	Totals
CURB:							
12-min.	120	19	19	7	7	37	37
1-hour	110	92	545	18	181	20	33
	120	313		110		35	
	140	33		11		33	
	150	107		42		39	
2-hour	110	139	153	22	29	16	19
	120	14		7		50	
TOTALS - CURB			717		217		30
OFF-STREET:							
2-hour	110	32	352	3	73	9	21
	120	137		43		31	
	140	183		27		15	
5-hour	110	2	13	1	1	50	8
	140	11					
TOTALS - OFF-STREET			365		74		20
TOTALS - ALL METERED PARKING			1,082		291		27

NOTES:
(1) Adjusted to reflect conditions of maximum parking usage throughout CTD.
(2) Corresponds to "Available Space Hours" for the peak parking hour.
(3) Includes overtime parking at meters, and illegal parking at curb (e.g. cars in truck loading zones, or in any "No Parking" areas).
(4) Includes parking not paid for, and overtime parking.

DILLON | WALLACEBURG TRAFFIC PLANNING STUDY

DETAILS OF RECOMMENDED CHANGES IN CURB PARKING REGULATIONS

PART I

CENTRAL TRAFFIC DISTRICT

STREET	LOCATION	RECOMMENDED CHANGE	NUMBER OF CURB PARKING SPACES REMOVED: 12-min. metered	REMOVED: 1-hour metered	REMOVED: 2-hour metered	REMOVED: no time limit non-metered	INSTALLED: 12-min. metered	INSTALLED: 30-min. metered	INSTALLED: 1-hour metered	INSTALLED: 2-hour metered
BRIDGE STREET	E. Side, north of Wallace St.	Convert ALL FOUR non-metered spaces to 1-hour metered spaces	-	-	-	4	-	-	4	-
	E. Side, between King and Wallace Sts.	Convert ALL EIGHT non-metered spaces to 2-hour metered spaces	-	-	-	8	-	-	-	8
	W. Side, between King and Wallace Sts.	Prohibit ALL (non-metered) parking	-	-	-	8	-	-	-	-
CAMP STREET	E. Side, between Wellington and Elizabeth Sts.	Convert ALL SIX non-metered spaces to 2-hour metered spaces	-	-	-	6	-	-	-	6
	E. Side, south of James St.	Convert ALL THREE 2-hour metered spaces to 1-hour metered spaces	-	-	3	-	-	-	3	-
CREEK STREET	E. Side, between Wellington and Elizabeth Sts.	Convert ALL SIX non-metered spaces to 2-hour metered spaces	-	-	-	6	-	-	-	6
	W. Side, south of James St.	Convert ALL FOUR 2-hour metered spaces to 1-hour metered spaces	-	-	4	-	-	-	4	-
ELIZABETH STREET	S. Side, between Nelson and La Fontaine Sts.	Convert ALL THREE non-metered spaces to 2-hour metered spaces	-	-	-	3	-	-	-	3
	S. Side, between Creek and Duncan Sts.	Prohibit ALL (non-metered) parking	-	-	-	8	-	-	-	-
HERBERT STREET	E. Side, between King and Queen/Gillard Sts.	Convert ALL TWENTY-TWO non-metered (angle) spaces to 2-hour metered (angle) spaces (1)	-	-	-	22	-	-	-	22
JAMES STREET	N. Side, between Dufferin Ave. and Fork St.	Prohibit ALL (metered) parking	-	23	15	-	-	-	-	-
	S. Side, between McNaughton Ave. and Camp St.	Remove FIRST 2-hour metered space east of Dufferin Ave. gore-intersection	-	-	1	-	-	-	-	-
	S. Side, between Nelson and Duncan Sts.	Remove FIRST 1-hour metered space west of Nelson St.	-	1	-	-	-	-	-	-
	S. Side, between Nelson St. and Sydenham River North Branch	Convert BOTH 1-hour metered spaces to 12-minute metered spaces (2)	-	2	-	-	2	-	-	-
	S. Side, between Nelson and William Sts.	Convert ALL TWENTY 1-hour metered spaces to 30-minute metered spaces (3)	-	20	-	-	-	20	-	-
	S. Side, between William St. and Dufferin Ave. gore-intersection	Convert ALL EIGHTEEN 2-hour metered spaces to 1-hour metered spaces (3)	-	-	18	-	-	-	18	-
LA FONTAINE STREET	E. Side, between Wellington and Elizabeth Sts.	Convert ALL SIX non-metered spaces to 2-hour metered spaces	-	-	-	6	-	-	-	6
	W. Side, between Wellington and Elizabeth Sts.	Prohibit ALL (non-metered) parking	-	-	-	8	-	-	-	-
McDOUGALL STREET	W. Side, north of Wallace St.	Convert ALL SIX 1-hour metered (angle) spaces to 30-minute metered (angle) spaces	-	6	-	-	-	6	-	-
NELSON STREET	W. Side, south of James St.	Convert ALL TEN 1-hour metered (angle) spaces to 30-minute metered (angle) spaces	-	10	-	-	-	10	-	-
	W. Side, between James and Wellington Sts.	Convert ALL SIX 1-hour metered spaces to 30-minute metered spaces	-	6	-	-	-	6	-	-
	E. Side, between James and Wellington Sts.	Convert ALL FOUR 1-hour metered spaces to 30-minute metered spaces	-	4	-	-	-	4	-	-
		Convert BOTH 12-minute metered spaces to 30-minute metered spaces	2	-	-	-	-	2	-	-

DETAILS OF RECOMMENDED CHANGES IN CURB PARKING REGULATIONS (CONTINUED)

PART I (cont'd.)

CENTRAL TRAFFIC DISTRICT										
STREET	LOCATION	RECOMMENDED CHANGE	NUMBER OF CURB PARKING SPACES							
			REMOVED				INSTALLED			
			12-min. metered	1-hour metered	2-hour metered	no time limit non-metered	12-min. metered	30-min. metered	1-hour metered	2-hour metered
NELSON STREET (continued)	W. Side, between Wellington and Elizabeth Sts.	Prohibit ALL (metered) parking (4)	-	7	-	-	-	-	-	-
	E. Side, between Wellington and Elizabeth Sts.	Prohibit ALL (metered) parking (4)	-	3	-	-	-	-	-	-
WALLACE STREET	N. Side, between McDougall and King/Herbert Sts.	Convert ALL SIX 1-hour metered spaces to 30-minute metered spaces	-	6	-	-	-	6	-	-
	N. Side, between McDougall and Bridge Sts.	Convert ALL SIX 1-hour metered spaces to 30-minute metered spaces	-	6	-	-	-	6	-	-
WELLINGTON STREET	N. Side, east of La Fontaine St.	Convert ALL SIX non-metered spaces to 2-hour metered spaces	-	-	-	6	-	-	-	6
WILLIAM STREET	E. Side, between Wellington and Elizabeth Sts.	Convert ALL SEVEN non-metered spaces to 12-minute metered spaces (5)	-	-	-	7	7	-	-	-
TOTALS			2	94	41	92	9	60	29	57

NOTES:

(1) These represent a uniform, continuous row of parking stalls close to the Town's commercial/retail core. None of the stalls encroach upon the travelled pavement of Herbert Street, while available space and visibility allow parking and unparking manoeuvres to be made efficiently and safely. Hence, as and when demand materializes, this group of stalls could provide the south side commercial area with a facility comparable in function and relative position to existing municipal lots north of the Sydenham River.

If the improvements shown in Exhibit 4.D are implemented, the number of stalls would be reduced to sixteen.

(2) If this is done, all four metered spaces in front of the Public Library would offer 12-minute time limits. This would establish uniformity for the group, and would enable more library users to park briefly while borrowing or returning books. In addition, the incidence of "false parking" would be diminished (i.e. the use of 12-minute meters by those requiring longer-term parking, caused by the mixture of metered time limits on this short block).

(3) In each case, the number of meters is adjusted in accordance with the meter removals specified by the second and third items under "James Street". 21 1-hour, and 19 2-hour metered spaces are presently located on the south side of James Street.

(4) Due to the proximity of these block faces to the newest municipal metered lot, it is recommended that all curb parking be prohibited.

(5) It is evident that parking requirements will increase in the Wellington/William Streets area due to the new Federal Building. Hence, it is suggested that the short-term parking invariably required by post office users be provided on William Street rather than on Wellington Street: curb parking subject to rapid turnover would give rise to turbulence in the arterial flow, and would reduce the level of safety attainable on this important route.

PART II STANDARDS FOR CURB PARKING PROHIBITION

In formulating the changes listed in Part I, certain widely accepted standards have been adopted. The following resume could form the basis of any additional restrictions the Corporation may consider.

(i) Curb parking shall be prohibited for distances of not less than 75 feet in advance of, and 30 feet beyond a major and/or signalized intersection:

- on the right-hand (i.e. approach) side of a major two-way street, and
- on both sides of a major one-way street

(ii) When the above prohibitions result in less than three curb spaces being left on any block face, the prohibition shall be extended to cover the entire block face.

(iii) Curb parking shall be prohibited:

- on any two-way street less than 24 feet in width (curb to curb), and
- on any one-way street less than 20 feet in width (curb to curb)

(iv) Curb parking shall be restricted to one side only:

- on any major two-way street less than 36 feet in width (curb to curb), and
- on any major one-way street less than 32 feet in width (curb to curb).

(v) As a general rule, when a municipal off-street parking facility is established, a number of curb parking spaces approaching one half of the lot capacity should be eliminated in the immediate vicinity: this commonly means that no curb parking should be permitted on either side of any street contiguous to the new facility. Such regulations could easily be applied to both new and existing municipal lots.

SUMMARY OF RECOMMENDED CHANGES IN CURB PARKING REGULATIONS BY ZONE

CENTRAL TRAFFIC DISTRICT

PART I

NUMBER OF SPACES REMOVED AND INSTALLED

NUMBER OF CURB PARKING SPACES																		
REMOVED										INSTALLED					NET CHANGES BY ZONE			
	Metered Curb			Total	Non-Metered Curb			Total		Metered Curb				TOTAL				
O-D ZONE NUMBER	12-min.	1-hour	2-hour		30-min.	no time limit	truck loading zone(2)		GRAND TOTAL	12-min.	30-min.	1-hour	2-hour		Non-metered curb	Metered Spaces	Non-Metered Spaces	TOTAL Spaces
110	-	16	39	55	-	-	-	-	55	-	8	25	-	33	-	Less 22	No Change	Less 22
120	2	50	2	54	-	-	2	2	56	2	34	-	-	36	-	Less 18	Less 2	Less 20
130	-	-	-		-	13	-	13	13	7	-	-	6	13	-	Plus 13	Less 13	No Change
140	-	10	-	10	-	37	-	37	47	-	-	-	21	21	-	Plus 11	Less 37	Less 26
150	-	18	-	18	-	42	-	42	60	-	18	4	30	52	-	Plus 34	Less 42	Less 8
TOTALS (CTD)	2	94	41	137	-	92	2	94	231	9	60	29	57	155	-	Plus 18	Less 94	Less 76

PART II

NUMBER OF SPACES EXISTING AND PROPOSED

NUMBER OF PARKING SPACES																			
EXISTING										PROPOSED									
	Metered Curb			Total	Non-Metered Curb			Total		Metered Curb				Total	Non-Metered Curb			Total	
O-D ZONE NUMBER	12-min.	1-hour	2-hour		30-min.	no time limit	truck loading zone(2)		GRAND TOTAL	12-min.	30-min.	1-hour	2-hour		30-min.	no time limit	truck loading zone(2)		GRAND TOTAL
110	-	16	39	55	10	4	-	14	69	-	8	25	-	33	10	4	-	14	47
120	4	50	2	56	-	-	6	6	62	4	34	-	-	38	-	-	4	4	42
130	-	-	-	-	-	82	-	82	82	7	-	-	6	13	-	69	-	69	82
140	-	10	-	10	-	62	3	65	75	-	-	-	21	21	-	25	3	28	49
150	-	34	-	34	-	51	6	57	91	-	18	20	30	68	-	9	6	15	83
	4	110	41	155	10	199	15	224	379	11	60	45	57	173	10	107	13	130	303
	1.1	29.0	10.8	40.9	2.6	52.5	4.0	59.1	100.0	3.6	19.8	14.8	18.8	57.0	3.3	35.4	4.3	43.0	100.0

NOTES: (1) Totals include both actual space removals (i.e. institution of parking prohibitions), and replacements (e.g. substitution of 1-hour meters by 30-minute meters; installation of 20hour meters at some curb parking spaces currently non-metered).

(2) Two existing truck-loading zones should be removed (both in O-D zone 120):

(a) North side of James Street, east of Duncan (in Appendix N, it is recommended that all parking on the north side of James Street be prohibited).

(b) West side of Nelson Street, north of James Street (when large trucks are parked here, visibility is obstructed for southbound drivers on Nelson Street, and for eastbound drivers on James Street).

APPENDIX P

WALLACEBURG TRAFFIC PLANNING STUDY

GLOSSARY

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APPENDIX P

WALLACEBURG TRAFFIC PLANNING STUDY

GLOSSARY

P.1 LAND USE AND PLANNING

- Business District: The territory contiguous to and including a roadway when within any 600 feet along such roadway there are buildings in use for business or industrial purposes, including but not limited to hotels, banks or office buildings, railroad stations, and public buildings which occupy at least 300 feet of frontage on one side, or 300 feet collectively on both sides of the roadway.

- Central Business District (C.B.D.): The major business district of a city. Sometimes called the downtown area.

- Central Traffic District (C.T.D.): The central business district of a city or town plus immediate surrounding area and streets generally used for parking by shoppers, employees and other persons making trips into the business district.

- Conceptual Planning: This involves defining the general form, purpose, and physical and financial magnitude of an improvement project, or (more commonly) of a long-term improvement program. It expresses fundamental ideas and conclusions arising directly from a transportation planning study, and is set forth only in general terms.

  Although items such as drainage, utilities relocation, soil conditions and property-taking limits are most certainly considered while project concepts are being developed, exhaustive study of these and of other "detail design" elements is not warranted at the conceptual design stage.

- Functional Planning; Functional Design: Normally, these techniques are applied after a comprehensive improvement program is developed in conceptual form. Functional planning leads to decisions concerning the actual location, conformation and functional design (i.e. the number of lanes,

preliminary interchange/intersection design, horizontal/vertical alignment, capacity, etc.) of a particular project, and also deals with the design standards to be adopted. Also, factors such as drainage, utilities relocation, soil conditions and property-taking limits, etc. are dealt with in depth.

Thus, functional planning represents a stage of refinement where alternative designs - all of which generally follow the conceptual plan - are developed and evaluated in terms of cost, traffic operation and overall suitability. These procedures usually complete the planning process per se, and serve to distinguish it from subsequent "detail design" and construction phases.

P.2 TRAFFICWAYS

- Geometric Design of Traffic Facilities (roadways, ramps, interchanges, terminals, bridges and approaches, etc.)

A general term encompassing all aspects of physical layout and design which may affect the operational efficiency, safety and riding comfort characteristics of traffic facilities.

Items which may be considered elements of geometric design include, but are not limited to:

right-of-way width and special clearance requirements,

design speed,

number and width of traffic lanes,

widths and design treatments of travelled way (pavement), shoulders, boulevards, medians, borders, curbs, lane separators, drainage structures (e.g. inlets) etc.,

superelevation rates (pavement cross-falls),

simple and compound horizontal curvature,

intersection treatment, including: separate R.H. and L.H. turn lanes, curb curvatures, pavement widenings on approaches, channelization, pavement markings, etc.

vertical alignment aspects, including sag and crest vertical curvature and the broad range of grade and profile considerations.

- Corridor of Travel: A linear or elongated area served by a group of roughly parallel traffic routes which are used by a clearly defined (traffic) movement. In an urban area, a corridor comprises an arterial or collector route (or, in the larger areas, a group of such routes) and the local "distribution/collection" network of streets connected thereto.

  Whereas, an urban travel corridor is necessarily somewhat restricted in scale, a rural travel corridor may be extremely broad and lengthy, comprising as it often does, a group of highways connecting centres of intense traffic generation (e.g. metroplitan areas, cities and larger towns) and traversing an extensive region.

- Urban Arterial Routes: In the small or medium-sized town, where no expressway or freeway system exists, the arterial route system must serve as the principal network for relatively heavy and long-distance traffic flows. Major arterial streets should connect areas of principal traffic generation and important rural highways entering the town. They should provide for distribution and collection of through traffic to and from collector and local street systems, and should not be called upon to provide direct vehicular (i.e. curb side) access to abutting properties unless absolutely necessary. The most important sections of the arterial system should provide at least four traffic lanes, and channelized intersections with major cross streets.

  A properly designated and developed major arterial system should help to define residential neighbourhoods, industrial sites and commercial areas, and should minimize conflicts with school and park developments. To provide sufficient capacity and the desired quality of service, major arterial streets should not be more than one mile apart.

- Urban Collector Routes: This system includes all distributor and collector streets serving traffic between major arterial routes and networks of local (neighbourhood) streets. Also included are those routes used mainly for traffic movement within

residential, industrial and commercial areas. They may also serve to connect adjacent neighbourhoods.

Collector routes should provide at least two lanes for moving traffic at all times, and could be expected to provide direct access to abutting properties, although large numbers of closely spaced driveways, etc. are to be avoided in order to promote efficient traffic flow.

Continuity of the collector street pattern is necessary if various areas are to be fully interconnected. In order to accommodate local movements, distribute traffic effectively and provide sufficient capacity, the major street system (arterials and collectors) should form a network of streets spaced from one-third to one-half mile apart.

- Urban Local Streets: Included in this system are all other streets (i.e. apart from arterial and collector routes) in the town. They are used primarily for direct access to residential, commercial, industrial or other abutting properties. Continuity of the local street system in residential areas is not particularly important. It should connect with major arterial or collector routes, and all through-traffic movement should be discouraged.

  In older sections of the average community, many local streets are of considerable length. Hence, there exists a tendency to use such streets for long-distance trips. However, when all streets are properly classified and then developed in accordance with their primary purposes, the longer local streets should be divided into functionally shorter sections by collectors and arterials.

- Added Turning Lane: Special lane for turning vehicles obtained by widening the normal roadway at intersections.

- Parking Bay: The parking area immediately adjacent to the margin of a street and abutting thereon, provided by especially widening the street. This area may or may not be separated from the street by an insulation strip. In either case, access to and egress from the bay is provided from the street proper.

- Separate Turning Lane: Added traffic lane separated from the intersection area by an island or unpaved area. It may be wide enough for 1-lane or 2-lane operation.

- Weaving Section: A section of a one-directional roadway serving as an elongated intersection of two one-directional roadways crossing each other at an acute angle, in such a manner that the interference between cross traffic is minimized through substitution of weaving for direct crossing of vehicle pathways.

- Weaving Lane: A section of a one-way or two-way roadway upon which weaving manoeuvres take place. Such a section is normally equal in width to a traffic lane (10 to 13 feet) and is generally reserved exclusively for weaving, by means of geometric design. Through traffic on the roadway is thus confined to other portions of the pavement cross-section.

P.3 TRAFFIC COMPOSITION

- External Traffic:

  (a) External-External or Through Traffic: Traffic proceeding through a district or municipality, not originating in or destined to the district or municipality (by-passable traffic).

  (b) Internal-External Traffic and External-Internal Traffic: Traffic made up of trips having origin (or destination) outside the External Origin and Destination Survey cordon, and destination (or origin) inside this cordon.

- Internal Traffic: Trips which take place wholly within the External Origin and Destination Survey cordon.

- Platoon: Closely grouped elemental components of traffic moving or standing ready to move over a roadway, with clear spaces ahead and behind.

- Simulated Traffic: That traffic volume which must be calculated for an Origin and Destination zone or other traffic generator for which current traffic generation characteristics are either unclear, unobtainable, incomplete or otherwise inapplicable,

within the context of a traffic study. Traffic generation factors, based upon land use and known traffic generated by existing developed areas, are used in calculating simulated volumes.

- Traffic Generation; Traffic Generator: Traffic generation denotes the amount of traffic (i.e. the number of person or vehicle trips) destined to and originating from a traffic generator (e.g. an Origin and Destination zone, a large store, factory or building complex) during a specified period of time (e.g. peak hourly, average daily, average weekday, weekly, monthly, annual traffic generation).

  Traffic generation factors are commonly established for various land uses, or on a zonal or regional basis, and may be used to estimate traffic which is potential to (i.e. traffic which would be generated by) such land uses or zones over a specified study period. Normally, traffic generation refers to total two-directional traffic.

- Trip: One-way travel between origin and destination.

P.4 TRAFFIC MOVEMENT

P.4.1 CAPACITY

- Basic Capacity: The maximum number of passenger cars that can pass a given point on a lane or roadway during one hour, under the most nearly ideal roadway and traffic conditions which can possibly be obtained.

- Possible Capacity: The maximum number of vehicles that can pass a given point on a lane or roadway during one hour, under the prevailing roadway and traffic conditions.

- Practical Capacity: The maximum number of vehicles that can pass a given point on a roadway or in a designated lane during one hour, without the traffic density being so great as to cause unreasonable delay, hazard or restriction to the drivers' freedom to manoeuvre under the prevailing roadway and traffic conditions.

P.4.2 GENERAL

- Average Daily Traffic (Volume): The total volume observed during a stated period divided by the number of days in that period; commonly abbreviated as ADT. If the period is a year, the term is Annual Average Daily Traffic volume, abbreviated as AADT.

- Average Weekday Traffic (Volume): The total volume observed during a stated number of weekdays (weekday in this context refers to a business day, Monday to Friday inclusive), divided by the number of weekdays; commonly abbreviated as AWDT. If possible, equivalent numbers of Mondays, Tuesdays, etc. are used to establish AWDT.

- Average Speed: The arithmetic average of the speeds of individual vehicles. This is computed by adding the values of all speed observations together, then dividing by the number of observations.

- Cordon Count: A count of all vehicles and persons entering and leaving a district (cordoned area) during a specified period.

- Cordon Line: An imaginary line encircling the cordoned area.

- Daily Traffic Pattern: A traffic flow configuration wherein traffic volumes for each of twenty-four consecutive hours are shown.

- Delay: Time lost by traffic due to traffic frictions, and also, when traffic is impeded in its movement by some element over which it has no control.

- Desire Line: A straight line between the point of origin and point of destination of a trip without regard to routes of travel (used in connection with an O-D study).

- Isochronal Chart: An urban area map upon which are plotted basically concentric "rings" representing equality of travel time. Each "ring" is constituted by a series of points which theoretically may be reached from a specified focal point(e.g. a major intersection or traffic generator) in the same time.

Isochronal charts may be based upon travel time by either private vehicle or public transport service, and may also represent pedestrian movement in areas of restricted size (e.g. central business districts of smaller municipalities). Depending upon the nature of the base survey, "terminal times" (e.g. time spent walking to and from parking areas; time spent waiting for public transport vehicles) may be considered in plotting isochronal lines.

Such charts are commonly the result of speed and delay or transit surveys, and lines may be established at any convenient time interval - normally 1- or 2-minute intervals for smaller urban areas of less than 4 square miles; perhaps 5- or 10-minute intervals for larger urban areas.

- Major Directional (Composite) Desire Line: A grouping of several desire lines having a like direction, and without regard to routes of travel.

- Operational Delay: Delay caused by mutual interference between vehicles. The difference between travel times over a route during times of extremely low and high traffic volumes, or the time consumed while waiting at a stop sign for cross traffic to clear, are operational delays. Time losses resulting from congestion, from interference with parking/unparking vehicles and from turning vehicles are also examples of operational delays.

- Origin and Destination (O-D) Survey: A survey of the origins and destinations of trips of vehicles and passengers. Usually included are all trips within, through, into or out of a selected area.

- Operating Speed: The highest running speed at which a driver can travel on a given roadway under prevailing conditions, without at any time exceeding the design speed.

- Point of Conflict: The point or limited area where elemental movements of traffic intersect or join a common path.

- Restrictive Sight Distance: A sight distance which, by reason of its inadequate length, causes a reduction in the operating speed and otherwise restrains the free movement of traffic under the prevailing conditions.

- Sight Distance at an Intersection: The distance from the driver's eye (his vehicle approaching the intersection) to the point of intersection of the paths of his vehicle and another approaching vehicle on a cross road, measured from the point where, as both vehicles approach the intersection, each driver is first able to see the other's vehicle. Where no sight obstruction exists on the intersection approach for several hundred feet, the sight distance is, for all practical purposes, unlimited.

- Speed and Delay Survey: A survey of overall traffic speed on a given street, and of causes and durations of traffic delays.

- Traffic Volume Assignment: This denotes the loading of a given pattern of travel desires (i.e. traffic volumes) upon a partial or complete route network, an individual route or a group (i.e. corridor) of routes.

- Traffic Variation: A tabular or graphical representation of the fluctuation in traffic volume at a given location, over a specified period of time.

- Travel Time: The time of travel, including stops and delays except those off the travelled way.

- Volume: The number of vehicles passing a given point during a specified period of time.

P.5 PARKING

- Parking Capacity: The maximum number of parked vehicles that can be accommodated in a specified area and manner.

- Parking Demand: The actual number of parked vehicles that are accommodated in a specified area and manner.

- Parking Duration: Length of time a specific vehicle (or average vehicle) is parked.

- Parking Turnover: The total number of parked cars accommodated during a stated time in a stated area (e.g. a specified number of stalls).

- Parking Turnover Rate: The number of times that a parking stall is used in a stated time. For a number of adjacent stalls, the average rate is usually given: this equals the number of parked vehicles observed divided by the number of stalls.

P.6 TRAFFIC CONTROL

P.6.1 TRAFFIC SIGNALS

- Fixed Time Control: Operation of a traffic signal installation with fixed time cycle length and divisions.

- Traffic Actuated Controller: A type of automatic controller which is actuated, under specific conditions, by impulses from individual vehicles or pedestrians, or both.

- Phase: A part of the total (signal) time cycle, allocated to any traffic movements receiving the right-of-way or to any combination of traffic movements receiving the right-of-way simultaneously.

- Progression: The characteristic of a signal system which makes possible the advance of platoons at a predetermined speed through a signal system without delay or interruption. Also the movement of traffic itself through a signal system without interruption at a predetermined rate of speed.

P.6.2 CHANNELIZATION - GENERAL

- Island: An area within a roadway from which vehicle traffic is intended to be excluded, together with any area at the approach thereto occupied by protective deflecting or warning devices.

- Channelizing Island: A traffic island located to guide traffic streams along certain definite paths, and to prevent the promiscuous movement of vehicles in what would otherwise be a widely extended roadway area.

- Markings: All lines, patterns, words, colours, or other devices, except signs, set into the surface of, applied upon or attached to the pavement or curbing, or to objects within or adjacent to the roadway, officially placed for the purpose of regulating, warning or guiding traffic.

APPENDIX Q

WALLACEBURG TRAFFIC PLANNING STUDY

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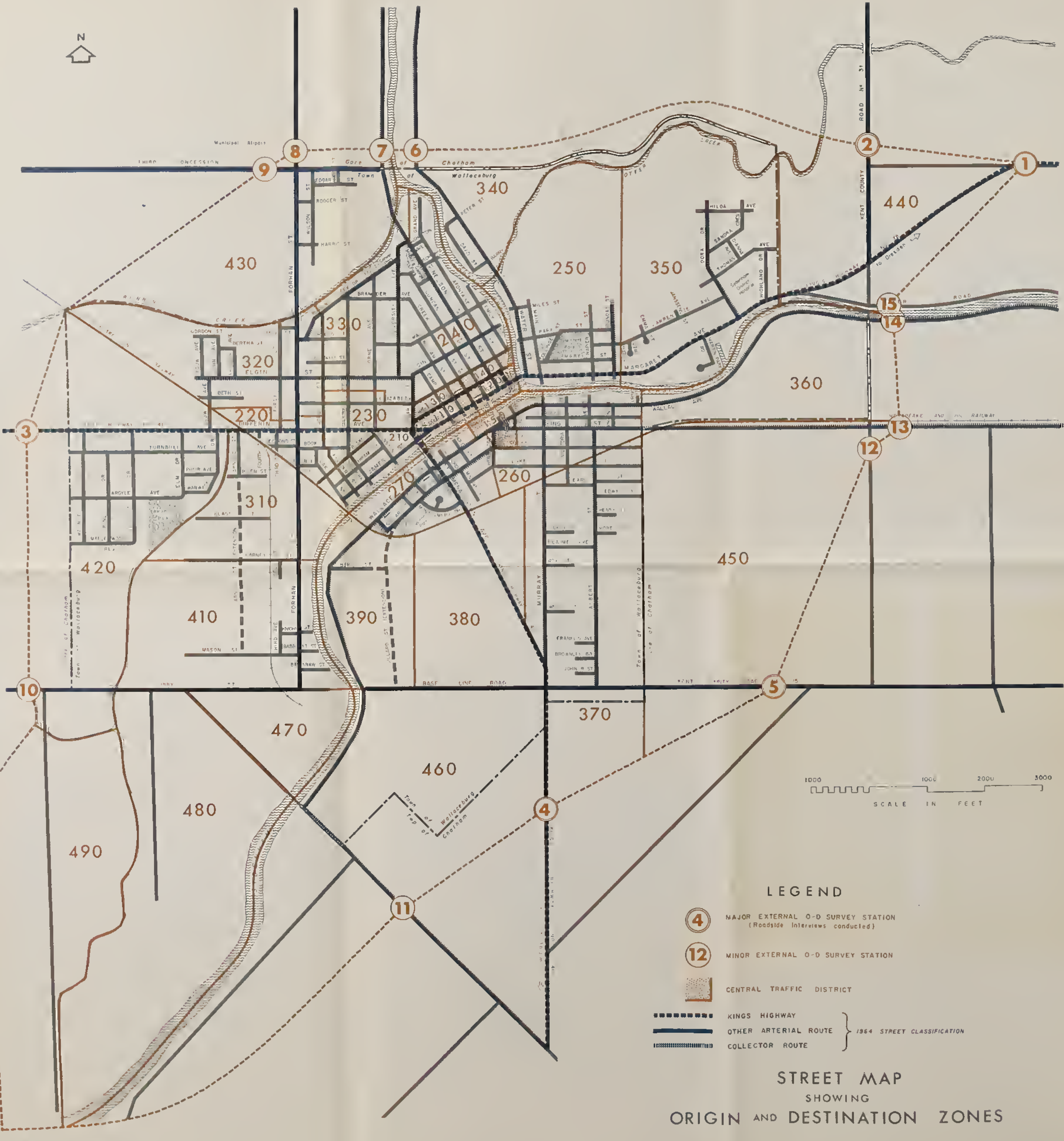
RECOMMENDED
MAJOR ROUTE SYSTEM
AND
PROJECT STAGING
LEGEND
KING'S HIGHWAY (Note 1)
OTHER ARTERIAL ROUTE
COLLECTOR ROUTE
POSSIBLE FUTURE ROUTE
INTERSECTION IMPROVEMENT
TRAFFIC CONTROL SIGNAL
EXISTING
PROPOSED
THIRD CONCESSION
MAIN ST EXTENSION
STAGE III
ESTABLISH RIGHT-OF-WAY STAGE I
ROAD CONSTRUCTION STAGE III
THOMAS AVE EXTENSION
THOMAS AVE
KENT COUNTY ROAD NO 31
HWY NO 78
RIVER RD
RUNNING CREEK DR.
BRANDER AVE
NELSON ST.
CREEK ST.
UNIVERSITY AVE
GORDON ST
ELGIN ST EXTENSION
ELM DRIVE EXTENSION
ELGIN ST.
Movable or Fixed Bridge (2/3 lanes)
MAIN ST.
Movable Bridge (4 lanes)
MARGARET AVE.
DUNDAS ST.
DORA DR.
WELLINGTON
JAMES ST.
WALLACE ST.
KING'S HWY NO 40
DUFFERIN AVE
KING ST.
QUEEN ST.
QUEEN ST EXTENSION
STAGE I
STAGE II
STAGE IV
GEORGE ST
OAK ST
ARNOLD ST
ELM DRIVE
ARGYLE AVE
SEE NOTE 2
FORHAN ST
GILLARD ST.
MCNAUGHTON AVE
EARL ST
MURRAY ST.
REAUME ST
ALBERT ST
MAPLEWOOD CRES
GARNET ST
HURON ST
GILLARD ST EXTENSION
ARNOLD ST EXTENSION
MASON ST.
HILLS ST
PAVING & FIRST PHASE WIDENING (34')
LIBBY ST
BASE LINE
PAVING (34')
KENT COUNTY ROAD NO 15
Movable Bridge (2/3 lanes)
BRIDGE, AND SECOND PHASE WIDENING OF ROADWAYS (68')
Proposed Relocation KING'S HWY NO 40 "Blue Water Parkway"
TO TAKE PLACE TENTATIVELY DURING STAGE II
High Level Bridge (2 lanes)
KING'S HWY NO 40
SCALE IN FEET
1000 0 1000 2000 3000
WALLACEBURG
TRAFFIC PLANNING STUDY

EXHIBIT 4 A



STREET MAP
SHOWING
ORIGIN AND DESTINATION ZONES


NOTES:
1. Only the existing (i.e. as of 19) KING'S HIGHWAY CONNECTING LINK SYSTEM can be indicated. Any changes in the agreement must be the subject of negotiation between the Town of Wallaceburg and the Department of Highways (Ontario).
2. If FORHAN STREET is closed, ELM DRIVE should be developed into a four-lane arterial. Conversely, if the former remains open, ELM DRIVE should serve as a collector, to be developed only as and when required.
Because of this uncertainty, staging of project cannot be stipulated with any degree of accuracy.
1000 0 1000 2000 3000
SCALE IN FEET
KENT COUNTY ROAD NO. 15
FORHAN ST.
LEGEND
PROPOSED PAVEMENT WIDENING
PROPOSED NEW ROUTES AND ROUTE EXTENSIONS